IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Prathyusha K. Salla et al.	§	Confirmation No.	9694
	§	Group Art Unit:	3737
Serial No.: 10/723,857	§		
	§	Examiner:	Mehta, Parikha Solanki
Filed: November 26, 2003	§		
For: METHOD AND SYSTEM FOR COMPOSITE GATING USING MULTIPLE INPUTS	§	Atty Docket:	132958-4 GEMS:0264/YOD/RAR/LIU

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July 3, 2008	**/John Rariden/**
Date	John M. Rariden

Sir:

APPEAL BRIEF PURSUANT TO 37 C.F.R. §§41.31 AND 41.37

This Appeal Brief is being filed in furtherance to the Notice of Appeal electronically filed and received by the Patent Office on May 5, 2008. The Commissioner is authorized to charge the requisite fee of $510.00, and any additional fees which may be necessary to advance prosecution of the present application, to Deposit Account No. 07-0845, Order No. 132958-4 (GEMS:0264/YOD/RAR).

1. REAL PARTY IN INTEREST

The real party in interest is General Electric Company, the parent company of GE Medical Systems Global Technology Company, L.L.C, the Assignee of the above-referenced application by virtue of the Assignment to GE Medical Systems Global Technology Company, L.L.C., by Prathyusha K. Salla, Gopal B. Avinash, and Cherik Bulkes, recorded at reel 014756, frame 0996, on November 25, 2003. Accordingly, General Electric Company, as the parent company of the Assignee of the above-referenced application, will be directly affected by the Board's decision in the pending appeal.

2. RELATED APPEALS AND INTERFERENCES

The Appellants are unaware of any other appeals or interferences related to this Appeal. The undersigned is the Appellants' legal representative in this Appeal.

3. STATUS OF CLAIMS

Claims 1-40 are currently pending, are currently under final rejection and, thus, are the subject of this Appeal.

4. STATUS OF AMENDMENTS

There are no outstanding claim amendments to be considered by the board.

5. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention relates generally to imaging techniques and more particularly to the measurement of the overall motion undergone by an organ. *See e.g.,* Application at page 1, lines 6-10. Specifically, the present technique relates to measuring the motion of one or more internal organs via one or more external sensors and/or via data acquired from a medical imaging system to determine the overall motion of at least one of the internal organs. *See e.g., id.* By utilizing the motion measurements, quiescent periods for an organ of interest corresponding to an interval of minimal absolute motion may be determined. *See e.g., id.* at page 2, line 17 to page 3, line 8. The quiescent period

may be used to determine gating points that may be used to gate the image data (prospectively and/or retrospectively) to reduce motion artifacts in a resulting image. *See e.g., id.* Furthermore, the quiescent period may be used to derive one or more motion compensation factors which may be applied during image processing to reduce motion artifacts. *See e.g., id.*

The present Application contains forty claims, namely claims 1-40, all of which are independent claims, and all of which are the subject of this appeal. Appellants respectfully note that while each of claims 1-40 are independent, certain groups of claims recite similar subject matter. In particular, Appellants note that claims 1-40 may be grouped as follows: claims 1-8 recite similar subject matter, wherein claims 1-4 are directed towards a method, a computer program, and imaging systems in accordance with one aspect of the invention, and claims 5-8 are directed towards a method, a computer program, and imaging systems in accordance with a further aspect of the invention; claims 9-16 recite similar subject matter, wherein claims 9-12 are directed towards a method, a computer program, and imaging systems in accordance with one aspect of the invention, and claims 13-16 are directed towards a method, a computer program, and imaging systems in accordance with a further aspect of the invention; claims 17-24 recite similar subject matter, wherein claims 17-20 are directed towards a method, a computer program, and imaging systems in accordance with one aspect of the invention, and claims 21-24 are directed towards a method, a computer program, and imaging systems in accordance with a further aspect of the invention; claims 25-32 recite similar subject matter, wherein claims 25-28 are directed towards a method, a computer program, and imaging systems in accordance with one aspect of the invention, and claims 29-32 are directed towards a method, a computer program, and imaging systems in accordance with a further aspect of the invention; and claims 33-40 recite similar subject matter, wherein claims 33-36 are directed towards a method, a computer program, and imaging systems in accordance with one aspect of the invention, and claims 37-40 are directed towards a method, a computer program, and imaging systems in accordance with a further aspect of

the invention. The subject matter of the pending claims is summarized below. In order to provide the Board with a thorough and organized summary of the recited subject matter, claims 1-40 have been summarized in accordance with the aforementioned groupings.

Claims 1-8

As noted above, claims 1-8 recite similar subject matter, wherein claims 1-4 are directed towards a method, a computer program, and imaging systems in accordance with one aspect of the invention, and wherein claims 5-8 are directed towards a method, a computer program, and imaging systems in accordance with a further aspect of the invention, as will be summarized below.

Independent Claims 1-4

With regard to the aspect of the invention set forth in independent claim 1, discussions of the recited features of claim 1 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 1 provides a method for imaging an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 24, line 20 – page 26, line 19; Figs. 1, 7-8. The method includes acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for two or more organs from at least one of one or more types of electrical sensors (*e.g.*, 42) and one or more types of non-electrical sensors (*e.g.*, 46). *See e.g., id.* at page 3, lines 10-17; page 12, line 15 – page 13, line 26; Figs. 1-2. The method further includes processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for an organ of interest. *See e.g., id.* at page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. The method further includes acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 20-22; Figs. 7-8. Additionally, the method includes processing (*e.g.*, 148) a portion of the set of image data (*e.g.*, 118) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 23 – page 25, line 23; Figs. 7-8. Finally, the

method includes displaying or storing an image (*e.g.*, 144) generated (*e.g.*, 146) from the portion of the set of image data (*e.g.*, 118). *See e.g., id.* at page 10, lines 7-11; page 25, lines 4-12; Figs. 1, 7-8.

Appellants respectfully note that claim 2 recites a corresponding computer program, provided on computer readable media (*e.g.* RAM, magnetic and optical storage devices, etc.) and adapted to perform the method recited by claim 1. *See e.g., id.* at page 10, lines 17-25. With regard to the aspect of the invention set forth in independent claim 2, discussions of the recited features of claim 2 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 2 provides a computer program, provided on one or more computer readable media, for imaging (*e.g.*, processing steps 138, 154) an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-31; Figs. 1, 7-8. The computer program includes a routine for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for two or more organs from at least one of one or more types of electrical sensors (*e.g.,* 42) and one or more types of non-electrical sensors (*e.g.*, 46). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 3, lines 10-17; page 12, line 15 – page 13, line 26; Figs. 1-2. The computer program further includes a routine for processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for an organ of interest. *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. Additionally, the computer program includes a routine for acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-22; Figs. 7-8. Finally, the computer program includes a routine for processing (*e.g.*, 148) a portion of the set of image data (*e.g.*, 118) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 23 – page 25, line 23; Figs. 7-8.

Appellants respectfully note that claim 3 recites an imaging system adapted to perform the method recited by claim 1. With regard to the aspect of the invention set forth in independent claim 3, discussions of the recited features of claim 3 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 3 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes an imager (*e.g.*, 12) configured to generate a plurality of signals (*e.g.*, 54, 58) representative of a region of interest. *See e.g., id.* at page 9, lines 1-27; page 14, line 3 – page 15, line 13; Figs. 1-2. The imaging system (*e.g.*, 10) further includes data acquisition circuitry (*e.g.*, 18) configured to acquire the plurality of signals. *See e.g., id.* at page 9, lines 20-27; Fig. 1. The imaging system (*e.g.*, 10) further includes data processing circuitry (*e.g.*, 20) configured to receive the plurality of signals, to process a set of motion data (*e.g.*, 72) describing the motion of two or more organs to derive two or more retrospective gating points (*e.g.*, 110) for at least one of the organs, and to process a portion of the plurality of signals based upon the two or more retrospective gating signals (*e.g.*, 110). *See e.g., id.* at page 9, line 29 – page 10, line 11; Figs. 1, 4, 6-8. The imaging system (*e.g.*, 10) further includes system control circuitry (*e.g.*, 16) configured to operate at least one of the imager (*e.g.*, 12) and the data acquisition circuitry (*e.g.*, 18) based upon two or more prospective gating points (*e.g.*, 110) derived from the set of motion data (*e.g.*, 72). *See e.g., id.* at page 9, lines 20-27; page 21, lines 11-14; page 24, lines 20-22; Figs 1, 5, 7-8. Additionally, the imaging system (*e.g.,* 10) includes an operator workstation (*e.g.*, 22) configured to communicate with the system control circuitry (*e.g.*, 16) and to receive at least the processed portion of the plurality of signals from the data processing circuitry (*e.g.*, 20). *See e.g., id.* at page 9, line 29 to page 11, line 11; Fig. 1. Finally, the imaging system (*e.g.,* 10) includes a sensor-based motion measurement system (*e.g.*, 34) configured to measure electrical (*e.g.*, 40, 42, 62, 64) or non-electrical activity (*e.g.*, 44, 46, 66, 68) indicative of the motion of at least one of the two or more organs within the region of interest to contribute to the set of motion data (*e.g.*, 72). *See e.g., id.* at page 11, line 27 – page 13, line 4; page 15, line 15 – page 16, line 2; Figs. 1-2.

Appellants respectfully note that claim 4 recites an imaging system adapted to perform the method recited by claim 1. With regard to the aspect of the invention set forth in independent claim 4, discussions of the recited features of claim 4 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 4 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes means (*e.g.*, data acquisition circuitry 18, motion determination system 34, sensors 36) for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for two or more organs from at least one of one or more types of electrical sensors (*e.g.*, 42) and one or more types of non-electrical sensors (*e.g.*, 46). *See e.g., id.* at page 9, lines 20-27; page 11, line 27 – page 13, line 26; page 15, line 15 – page 16, line 2; Figs. 1-2. The imaging system (*e.g.*, 10) further includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 154) the set of motion data to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for an organ of interest. *See e.g., id.* at page 9, line 29 to page 11, line 11; page 18, lines 7-18; Figs. 1, 4. Additionally, the imaging system (*e.g.*, 10) includes means (*e.g.*, imager 12) for acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 1-27; page 14, line 3 – page 15, line 13; page 24, lines 20-22; Figs. 1, 7-8. Finally, the imaging system (*e.g.*, 10) includes means for processing (*e.g.*, data processing circuitry 20, operator workstation 22) a portion (*e.g.*, 142) of the set of image data (*e.g.*, 118) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, line 29 – page 11, line 11; page 25, lines 14-23; Figs. 1, 7-8.

Independent Claims 5-8

With regard to the aspect of the invention set forth in independent claim 5, discussions of the recited features of claim 5 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 5 provides a method for imaging an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 24, line 20 – page 26, line 19; Figs. 1, 7-8. The method

includes acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for two or more organs from at least one of one or more types of electrical sensors (*e.g.*, 42) and one or more types of non-electrical sensors (*e.g.*, 46). *See e.g., id.* at page 3, lines 19-28; page 12, line 15 – page 13, line 26; Figs. 1-2. The method further includes processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for an organ of interest. *See e.g., id.* at page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. The method further includes initiating and terminating the acquisition (*e.g.*, 116) of a set of image data (*e.g.*, 118) representative of the organ of interest based on the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 20-22; Figs. 7-8. The method further includes reconstructing (*e.g.*, 140) the set of image data (*e.g.*, 118) to generate a set of reconstructed data (*e.g.*, 142). *See e.g., id.* at page 25, lines 1-6. Additionally, the method includes processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 23 – page 25, line 23; Figs. 7-8. Finally, the method includes displaying or storing an image (*e.g.*, 144) generated (*e.g.*, 146) from the portion of the set of reconstructed data (*e.g.*, 142). *See e.g., id.* at page 10, lines 7-11; page 25, lines 4-12; Figs. 1, 7-8.

Appellants respectfully note that claim 6 recites a corresponding computer program, provided on computer readable media (*e.g.* RAM, magnetic and optical storage devices, etc.) and adapted to perform the method recited by claim 5. *See e.g., id.* at page 10, lines 17-25. With regard to the aspect of the invention set forth in independent claim 6, discussions of the recited features of claim 6 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 6 provides a computer program, provided on one or more computer readable media, for imaging (*e.g.*, processing steps 138, 154) an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-31; Figs. 1, 7-8. The computer program includes a routine for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for two or more organs from at least one of one or

more types of electrical sensors (*e.g.,* 42) and one or more types of non-electrical sensors (*e.g.*, 46). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 3, lines 10-17; page 12, line 15 – page 13, line 26; Figs. 1-2. The computer program further includes a routine for processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for an organ of interest. *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. The computer program further includes a routine for initiating and terminating the acquisition (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the organ of interest based on the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-22; Figs. 7-8. Additionally, the computer program includes a routine for reconstructing (*e.g.*, 140) the set of image data to generate a set of reconstructed data (*e.g.*, 142). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 23 – page 25, line 23; Figs. 7-8. Finally, the computer program includes a routine for processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 23 – page 25, line 23; Figs. 7-8.

Appellants respectfully note that claim 7 recites an imaging system adapted to perform the method recited by claim 5. With regard to the aspect of the invention set forth in independent claim 7, discussions of the recited features of claim 7 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 7 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes an imager (*e.g.*, 12) configured to generate a plurality of signals (*e.g.*, 54, 58) representative of a region of interest. *See e.g., id.* at page 9, lines 1-27; page 14, line 3 – page 15, line 13; Figs. 1-2. The imaging system (*e.g.*, 10) further includes data acquisition circuitry (*e.g.*, 18) configured to acquire the plurality of signals. *See e.g., id.* at page 9, lines 20-27; Fig. 1. The imaging system (*e.g.*, 10) further includes data processing circuitry (*e.g.*, 20) configured

to receive the plurality of signals, to process a set of motion data (*e.g.*, 72) describing the motion of two or more organs to derive two or more retrospective gating points (*e.g.*, 110) for at least one of the organs, to reconstruct the plurality of signals to generate a set of reconstructed data (*e.g.*, 142), and to process (*e.g.*, 148) a portion of the reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating signals (*e.g.*, 110). *See e.g., id.* at page 9, line 29 – page 10, line 11; page 25, lines 1-23; Figs. 1, 4, 6-8. The imaging system (*e.g.*, 10) further includes system control circuitry (*e.g.*, 16) configured to operate at least one of the imager (*e.g.*, 12) and the data acquisition circuitry (*e.g.*, 18) based upon two or more prospective gating points (*e.g.*, 110) derived from the set of motion data (*e.g.*, 72) to initiate and terminate the acquisition (*e.g.*, 116) of a set of image data (*e.g.*, 118) representative of an organ of interest. *See e.g., id.* at page 9, lines 20-27; page 21, lines 11-14; page 24, lines 20-22; Figs 1, 5, 7-8. Additionally, the imaging system (*e.g.,* 10) includes an operator workstation (*e.g.*, 22) configured to communicate with the system control circuitry (*e.g.*, 16) and to receive at least the processed portion of the plurality of signals from the data processing circuitry (*e.g.*, 20). *See e.g., id.* at page 9, line 29 to page 11, line 11; Fig. 1. Finally, the imaging system (*e.g.,* 10) includes a sensor-based motion measurement system (*e.g.*, 34) configured to measure electrical (*e.g.*, 40, 42, 62, 64) or non-electrical activity (*e.g.*, 44, 46, 66, 68) indicative of the motion of at least one of the two or more organs within the region of interest to contribute to the set of motion data (*e.g.*, 72). *See e.g., id.* at page 11, line 27 – page 13, line 4; page 15, line 15 – page 16, line 2; Figs. 1-2.

Appellants respectfully note that claim 8 recites an imaging system adapted to perform the method recited by claim 5. With regard to the aspect of the invention set forth in independent claim 8, discussions of the recited features of claim 8 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 8 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes means (*e.g.*, data acquisition circuitry 18, motion determination system 34, sensors 36) for acquiring (*e.g.*,

64, 68) a set of motion data (*e.g.*, 72) for two or more organs from at least one of one or more types of electrical sensors (*e.g.*, 42) and one or more types of non-electrical sensors (*e.g.*, 46). *See e.g., id.* at page 9, lines 20-27; page 11, line 27 – page 13, line 26; page 15, line 15 – page 16, line 2; Figs. 1-2. The imaging system (*e.g.*, 10) further includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 154) the set of motion data to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for an organ of interest. *See e.g., id.* at page 9, line 29 to page 11, line 11; page 18, lines 7-18; Figs. 1, 4. The imaging system (*e.g.*, 10) further includes means (*e.g.*, imager 12, data processing circuitry 20, operator workstation 22) for initiating and terminating (*e.g.*, data processing circuitry 20, operator workstation 22) the acquisition (*e.g.*, 116) of a set of image data (*e.g.*, 118) representative of the organ of interest based on the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, line 1 – page 11, line 11; page 14, line 3 – page 15, line 13; page 24, lines 20-22; Figs. 1, 7-8. Additionally, the imaging system (*e.g.*, 10) includes means for reconstructing (*e.g.*, data processing circuitry 20, operator workstation 22) the set of image data (*e.g.*, 118) to generate a set of reconstructed data (*e.g.*, 142). *See e.g., id.* at page 9, line 29 – page 11, line 11; page 25, lines 1-6; Figs. 1, 7-8. Finally, the imaging system (*e.g.*, 10) includes means for processing (*e.g.*, data processing circuitry 20, operator workstation 22) a portion (*e.g.*, 142) of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, line 29 – page 11, line 11; page 25, lines 14-23; Figs. 1, 7-8.

Claims 9-16

As noted above, claims 9-16 recite similar subject matter, wherein claims 9-12 are directed towards a method, a computer program, and imaging systems in accordance with one aspect of the invention, and wherein claims 13-16 are directed towards a method, a computer program, and imaging systems in accordance with a further aspect of the invention, as will be summarized below.

Independent Claims 9-12

With regard to the aspect of the invention set forth in independent claim 9, discussions of the recited features of claim 9 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 9 provides a method for imaging an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 24, line 20 – page 26, line 19; Figs. 1, 7-8. The method includes acquiring (*e.g.*, 68) a set of motion data (*e.g.*, 72) for an organ of interest from at least one or more non-electrical sensors (*e.g.*, 46). *See e.g., id.* at page 3, line 30 – page 4, line 6; page 12, line 29 – page 13, line 26; Figs. 1-2. The method further includes processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for an organ of interest. *See e.g., id.* at page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. The method further includes initiating and terminating the acquisition (*e.g.*, 116) of a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 20-22; Figs. 7-8. Additionally, the method includes processing (*e.g.*, 148) a portion of the set of image data (*e.g.*, 118) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 23 – page 25, line 23; Figs. 7-8. Finally, the method includes displaying or storing an image (*e.g.*, 144) generated (*e.g.*, 146) from the portion of the set of image data (*e.g.*, 118). *See e.g., id.* at page 10, lines 7-11; page 25, lines 4-12; Figs. 1, 7-8.

Appellants respectfully note that claim 10 recites a corresponding computer program, provided on computer readable media (*e.g.* RAM, magnetic and optical storage devices, etc.) and adapted to perform the method recited by claim 9. *See e.g., id.* at page 10, lines 17-25. With regard to the aspect of the invention set forth in independent claim 10, discussions of the recited features of claim 10 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 10 provides a computer program, provided on one or more computer readable media, for imaging (*e.g.*, processing steps 138, 154) an organ (*e.g.*, organ

belonging to patient 14). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-31; Figs. 1, 7-8. The computer program includes a routine for acquiring (*e.g.*, 68) a set of motion data (*e.g.*, 72) for an organ of interest from at least one or more non-electrical sensors (*e.g.*, 46). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 3, line 30 – page 4, line 6; page 12, line 29 – page 13, line 26; Figs. 1-2. The computer program further includes a routine for processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for an organ of interest. *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. Additionally, the computer program includes a routine for initiating and terminating the acquisition (*e.g.*, 116) of a set of image data (*e.g.*, 118) representative of the organ of interest based on the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-22; Figs. 7-8. Finally, the computer program includes a routine for processing (*e.g.*, 148) a portion of the set of image data (*e.g.*, 118) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 23 – page 25, line 23; Figs. 7-8.

Appellants respectfully note that claim 11 recites an imaging system adapted to perform the method recited by claim 9. With regard to the aspect of the invention set forth in independent claim 11, discussions of the recited features of claim 11 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 11 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes an imager (*e.g.*, 12) configured to generate a plurality of signals (*e.g.*, 54, 58) representative of a region of interest. *See e.g., id.* at page 9, lines 1-27; page 14, line 3 – page 15, line 13; Figs. 1-2. The imaging system (*e.g.*, 10) further includes data acquisition circuitry (*e.g.*, 18) configured to acquire the plurality of signals. *See e.g., id.* at page 9, lines 20-27; Fig. 1. The imaging system (*e.g.*, 10) further includes data processing circuitry (*e.g.*, 20) configured to receive the plurality of signals, to process a set of motion data (*e.g.*, 72) describing the

motion of an organ of interest to derive two or more retrospective gating points (*e.g.*, 110) for the organ, and to process a portion of the plurality of signals based upon the two or more retrospective gating signals (*e.g.*, 110). *See e.g., id.* at page 9, line 29 – page 10, line 11; Figs. 1, 4, 6-8. The imaging system (*e.g.*, 10) further includes system control circuitry (*e.g.,* 16) configured to operate at least one of the imager (*e.g.*, 12) and the data acquisition circuitry (*e.g.*, 18) based upon two or more prospective gating points (*e.g.*, 110) derived from the set of motion data (*e.g.*, 72) to initiate and terminate the acquisition (*e.g.*, 116) of a set of image data (*e.g.*, 118) representative of the organ of interest. *See e.g., id.* at page 9, lines 20-27; page 21, lines 11-14; page 24, lines 20-22; Figs 1, 5, 7-8. Additionally, the imaging system (*e.g.,* 10) includes an operator workstation (*e.g.*, 22) configured to communicate with the system control circuitry (*e.g.*, 16) and to receive at least the processed portion of the plurality of signals from the data processing circuitry (*e.g.*, 20). *See e.g., id.* at page 9, line 29 to page 11, line 11; Fig. 1. Finally, the imaging system (*e.g.*, 10) includes a sensor-based motion measurement system (*e.g.*, 44) configured to measure non-electrical activity (*e.g.*, 44, 46, 66, 68) indicative of the motion of the organ of interest to contribute to the set of motion data (*e.g.*, 72). *See e.g., id.* at page 12, line 29 – page 13, line 4; page 15, line 15 – page 16, line 2; Figs. 1-2.

Appellants respectfully note that claim 12 recites an imaging system adapted to perform the method recited by claim 9. With regard to the aspect of the invention set forth in independent claim 12, discussions of the recited features of claim 12 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 12 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes means (*e.g.*, data acquisition circuitry 18, motion determination system 34, sensors 36) or acquiring (*e.g.*, 68) a set of motion data (*e.g.*, 72) for an organ from at least one or more non-electrical sensors (*e.g.*, 46). *See e.g., id.* at page 9, lines 20-27; page 11, line 27 – page 12, line 13; page 12, line 29 – page 13, line 26; page 15, line 15 – page 16, line 2; Figs. 1-2. The imaging system (*e.g.*, 10) further includes means (*e.g.*, data processing

circuitry 20, operator workstation 22) for processing (*e.g.*, 154) the set of motion data to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for an organ of interest. *See e.g., id.* at page 9, line 29 to page 11, line 11; page 18, lines 7-18; Figs. 1, 4. Additionally, the imaging system (*e.g.*, 10) includes means (*e.g.*, imager 12, data processing circuitry 20, operator workstation 22) for initiating and terminating the acquisition (*e.g.*, 116) of a set of image data (*e.g.*, 118) representative of the organ of interest based on the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, line 1 – page 11, line 11; page 14, line 3 – page 15, line 13; page 24, lines 20-22; Figs. 1, 7-8. Finally, the imaging system (*e.g.*, 10) includes means for processing (*e.g.*, data processing circuitry 20, operator workstation 22) a portion (*e.g.*, 142) of the set of image data (*e.g.*, 118) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, line 29 – page 11, line 11; page 25, lines 14-23; Figs. 1, 7-8.

Independent Claims 13-16

With regard to the aspect of the invention set forth in independent claim 13, discussions of the recited features of claim 13 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 13 provides a method for imaging an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 24, line 20 – page 26, line 19; Figs. 1, 7-8. The method includes acquiring (*e.g.*, 68) a set of motion data (*e.g.*, 72) for an organ of interest from at least one or more non-electrical sensors (*e.g.*, 46). *See e.g., id.* at page 4, lines 8-16; page 12, line 29 – page 13, line 26; Figs. 1-2. The method further includes processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for an organ of interest. *See e.g., id.* at page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. The method further includes acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 20-22; Figs. 7-8. The method further includes

reconstructing (*e.g.*, 140) the set of image data (*e.g.*, 118) to generate a set of reconstructed data (*e.g.*, 142). *See e.g., id.* at page 25, lines 1-6. Additionally, the method includes processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 23 – page 25, line 23; Figs. 7-8. Finally, the method includes displaying or storing an image (*e.g.*, 144) generated (*e.g.*, 146) from the portion of the set of reconstructed data (*e.g.*, 142). *See e.g., id.* at page 10, lines 7-11; page 25, lines 4-12; Figs. 1, 7-8.

Appellants respectfully note that claim 14 recites a corresponding computer program, provided on computer readable media (*e.g.* RAM, magnetic and optical storage devices, etc.) and adapted to perform the method recited by claim 13. *See e.g., id.* at page 10, lines 17-25. With regard to the aspect of the invention set forth in independent claim 14, discussions of the recited features of claim 14 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 14 provides a computer program, provided on one or more computer readable media, for imaging (*e.g.*, processing steps 138, 154) an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-31; Figs. 1, 7-8. The computer program includes a routine for acquiring (*e.g.*, 68) a set of motion data (*e.g.*, 72) for an organ of interest from at least one or more non-electrical sensors (*e.g.*, 46). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 3, line 30 – page 4, line 6; page 12, line 29 – page 13, line 26; Figs. 1-2. The computer program further includes a routine for processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for an organ of interest. *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. Additionally, the computer program includes a routine for acquiring (*e.g.*, 116) of a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-22; Figs. 7-8. Additionally, the computer program includes a routine

for reconstructing (*e.g.*, 140) the set of image data to generate a set of reconstructed data (*e.g.*, 142). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 23 – page 25, line 23; Figs. 7-8. Finally, the computer program includes a routine for processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 23 – page 25, line 23; Figs. 7-8.

Appellants respectfully note that claim 15 recites an imaging system adapted to perform the method recited by claim 13. With regard to the aspect of the invention set forth in independent claim 15, discussions of the recited features of claim 15 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 15 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes an imager (*e.g.*, 12) configured to generate a plurality of signals (*e.g.*, 54, 58) representative of a region of interest. *See e.g., id.* at page 9, lines 1-27; page 14, line 3 – page 15, line 13; Figs. 1-2. The imaging system (*e.g.*, 10) further includes data acquisition circuitry (*e.g.*, 18) configured to acquire the plurality of signals. *See e.g., id.* at page 9, lines 20-27; Fig. 1. The imaging system (*e.g.*, 10) further includes data processing circuitry (*e.g.*, 20) configured to receive the plurality of signals, to process a set of motion data (*e.g.*, 72) describing the motion of an organ of interest to derive two or more retrospective gating points (*e.g.*, 110), to reconstruct the plurality of signals to generate a set of reconstructed data (*e.g.*, 142), and to process (*e.g.*, 148) a portion of the reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating signals (*e.g.*, 110). *See e.g., id.* at page 9, line 29 – page 10, line 11; page 25, lines 1-23; Figs. 1, 4, 6-8. The imaging system (*e.g.*, 10) further includes system control circuitry (*e.g.*, 16) configured to operate at least one of the imager (*e.g.*, 12) and the data acquisition circuitry (*e.g.*, 18) based upon two or more prospective gating points (*e.g.*, 110) derived from the set of motion data (*e.g.*, 72). *See e.g., id.* at page 9, lines 20-27; page 21, lines 11-14; page 24, lines 20-22; Figs 1, 5, 7-8. Additionally, the imaging system (*e.g.*, 10) includes an operator workstation (*e.g.*, 22) configured to

communicate with the system control circuitry (*e.g.*, 16) and to receive at least the processed portion of the plurality of signals from the data processing circuitry (*e.g.*, 20). *See e.g., id.* at page 9, line 29 to page 11, line 11; Fig. 1. Finally, the imaging system (*e.g.*, 10) includes a sensor-based motion measurement system (*e.g.*, 44) configured to measure non-electrical activity (*e.g.*, 44, 46, 66, 68) indicative of the motion of the organ of interest to contribute to the set of motion data (*e.g.*, 72). *See e.g., id.* at page 12, line 29 – page 13, line 4; page 15, line 15 – page 16, line 2; Figs. 1-2.

Appellants respectfully note that claim 16 recites an imaging system adapted to perform the method recited by claim 13. With regard to the aspect of the invention set forth in independent claim 16, discussions of the recited features of claim 16 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 16 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes means (*e.g.*, data acquisition circuitry 18, motion determination system 34, sensors 36) or acquiring (*e.g.*, 68) a set of motion data (*e.g.*, 72) for an organ from at least one or more non-electrical sensors (*e.g.*, 46). *See e.g., id.* at page 9, lines 20-27; page 11, line 27 – page 12, line 13; page 12, line 29 – page 13, line 26; page 15, line 15 – page 16, line 2; Figs. 1-2. The imaging system (*e.g.*, 10) further includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 154) the set of motion data to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for an organ of interest. *See e.g., id.* at page 9, line 29 to page 11, line 11; page 18, lines 7-18; Figs. 1, 4. The imaging system (*e.g.*, 10) further includes means (*e.g.*, imager 12, data processing circuitry 20, operator workstation 22) for acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, line 1 – page 11, line 11; page 14, line 3 – page 15, line 13; page 24, lines 20-22; Figs. 1, 7-8. Additionally, the imaging system (*e.g.*, 10) includes means for reconstructing (*e.g.*, data processing circuitry 20, operator workstation 22) the set of image data (*e.g.*, 118) to generate a set of

reconstructed data (*e.g.*, 142). *See e.g., id.* at page 9, line 29 – page 11, line 11; page 25, lines 1-6; Figs. 1, 7-8. Finally, the imaging system (*e.g.*, 10) includes means for processing (*e.g.*, data processing circuitry 20, operator workstation 22) a portion (*e.g.*, 142) of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, line 29 – page 11, line 11; page 25, lines 14-23; Figs. 1, 7-8.

Claims 17-24

As noted above, claims 17-24 recite similar subject matter, wherein claims 17-20 are directed towards a method, a computer program, and imaging systems in accordance with one aspect of the invention, and wherein claims 21-24 are directed towards a method, a computer program, and imaging systems in accordance with a further aspect of the invention, as will be summarized below.

Independent Claims 17-20

With regard to the aspect of the invention set forth in independent claim 17, discussions of the recited features of claim 17 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 17 provides a method for imaging an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 24, line 20 – page 26, line 19; Figs. 1, 7-8. The method includes acquiring (*e.g.*, 64) a set of motion data (*e.g.*, 72) for a respiratory organ of interest from at least one or more electrical sensors (*e.g.*, 42). *See e.g., id.* at page 4, lines 18-25; page 12, lines 15-27; page 15, lines 15-22; Figs. 1-2. The method further includes processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for the respiratory organ of interest. *See e.g., id.* at page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. The method further includes initiating and terminating the acquisition (*e.g.*, 116) of a set of image data (*e.g.*, 118) representative of the respiratory organ of interest based on the two or more prospective gating points (*e.g.*, 110). *See e.g., id.*

at page 24, lines 20-22; Figs. 7-8. Additionally, the method includes processing (*e.g.*, 148) a portion of the set of image data (*e.g.*, 118) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 23 – page 25, line 23; Figs. 7-8. Finally, the method includes displaying or storing an image (*e.g.*, 144) generated (*e.g.*, 146) from the portion of the set of image data (*e.g.*, 118). *See e.g., id.* at page 10, lines 7-11; page 25, lines 4-12; Figs. 1, 7-8.

Appellants respectfully note that claim 18 recites a corresponding computer program, provided on computer readable media (*e.g.* RAM, magnetic and optical storage devices, etc.) and adapted to perform the method recited by claim 17. *See e.g., id.* at page 10, lines 17-25. With regard to the aspect of the invention set forth in independent claim 18, discussions of the recited features of claim 18 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 18 provides a computer program, provided on one or more computer readable media, for imaging (*e.g.*, processing steps 138, 154) an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-31; Figs. 1, 7-8. The computer program includes a routine for acquiring (*e.g.*, 64) a set of motion data (*e.g.*, 72) for a respiratory organ of interest from at least one or more electrical sensors (*e.g.*, 42). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 12, line 29 – page 13, line 26; page 15, lines 15-22; Figs. 1-2. The computer program further includes a routine for processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for the respiratory organ of interest. *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. Additionally, the computer program includes a routine for initiating and terminating the acquisition (*e.g.*, 116) of a set of image data (*e.g.*, 118) representative of the respiratory organ of interest based on the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-22; Figs. 7-8. Finally, the computer program includes a routine for processing (*e.g.*, 148) a portion of the

set of image data (*e.g.*, 118) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 23 – page 25, line 23; Figs. 7-8.

Appellants respectfully note that claim 19 recites an imaging system adapted to perform the method recited by claim 17. With regard to the aspect of the invention set forth in independent claim 19, discussions of the recited features of claim 19 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 19 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes an imager (*e.g.*, 12) configured to generate a plurality of signals (*e.g.*, 54, 58) representative of a region of interest. *See e.g., id.* at page 9, lines 1-27; page 14, line 3 – page 15, line 13; Figs. 1-2. The imaging system (*e.g.*, 10) further includes data acquisition circuitry (*e.g.*, 18) configured to acquire the plurality of signals. *See e.g., id.* at page 9, lines 20-27; Fig. 1. The imaging system (*e.g.*, 10) further includes data processing circuitry (*e.g.*, 20) configured to receive the plurality of signals, to process a set of motion data (*e.g.*, 72) describing the motion of a respiratory organ of interest to derive two or more retrospective gating points (*e.g.*, 110) for the respiratory organ, and to process a portion of the plurality of signals based upon the two or more retrospective gating signals (*e.g.*, 110). *See e.g., id.* at page 9, line 29 – page 10, line 11; page 15, lines 15-22; Figs. 1, 4, 6-8. The imaging system (*e.g.*, 10) further includes system control circuitry (*e.g.*, 16) configured to operate at least one of the imager (*e.g.*, 12) and the data acquisition circuitry (*e.g.*, 18) based upon two or more prospective gating points (*e.g.*, 110) derived from the set of motion data (*e.g.*, 72) to initiate and terminate the acquisition (*e.g.*, 116) of a set of image data (*e.g.*, 118) representative of the respiratory organ. *See e.g., id.* at page 9, lines 20-27; page 15, lines 15-22; page 21, lines 11-14; page 24, lines 20-22; Figs 1, 5, 7-8. Additionally, the imaging system (*e.g.*, 10) includes an operator workstation (*e.g.*, 22) configured to communicate with the system control circuitry (*e.g.*, 16) and to receive at least the processed portion of the plurality of signals from the data processing circuitry (*e.g.*, 20).

See e.g., id. at page 9, line 29 to page 11, line 11; Fig. 1. Finally, the imaging system (*e.g.*, 10) includes a sensor-based motion measurement system (*e.g.*, 40) configured to measure electrical activity (*e.g.*, 40, 42, 62, 64) indicative of the motion of the respiratory organ of interest to contribute to the set of motion data (*e.g.*, 72). *See e.g., id.* at page 12, line 29 – page 13, line 4; page 15, line 15 – page 16, line 2; Figs. 1-2.

Appellants respectfully note that claim 20 recites an imaging system adapted to perform the method recited by claim 17. With regard to the aspect of the invention set forth in independent claim 20, discussions of the recited features of claim 20 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 20 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes means (*e.g.*, data acquisition circuitry 18, motion determination system 34, sensors 36) or acquiring (*e.g.*, 68) a set of motion data (*e.g.*, 72) for a respiratory organ from at least one or more electrical sensors (*e.g.*, 42). *See e.g., id.* at page 9, lines 20-27; page 11, line 27 – page 13, line 26; page 15, line 15 – page 16, line 2; Figs. 1-2. The imaging system (*e.g.*, 10) further includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 154) the set of motion data to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for the respiratory organ of interest. *See e.g., id.* at page 9, line 29 to page 11, line 11; page 15, lines 15-22; page 18, lines 7-18; Figs. 1, 4. Additionally, the imaging system (*e.g.*, 10) includes means (*e.g.*, imager 12, data processing circuitry 20, operator workstation 22) for initiating and terminating the acquisition (*e.g.*, 116) of a set of image data (*e.g.*, 118) representative of the respiratory organ of interest based on the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, line 1 – page 11, line 11; page 14, line 3 – page 15, line 22; page 24, lines 20-22; Figs. 1, 7-8. Finally, the imaging system (*e.g.*, 10) includes means for processing (*e.g.*, data processing circuitry 20, operator workstation 22) a portion (*e.g.*, 142) of the set of image data (*e.g.*, 118) based upon the two or more retrospective gating points

(*e.g.*, 110). *See e.g., id.* at page 9, line 29 – page 11, line 11; page 25, lines 14-23; Figs. 1, 7-8.

Independent Claims 21-24

With regard to the aspect of the invention set forth in independent claim 21, discussions of the recited features of claim 21 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 21 provides a method for imaging an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 24, line 20 – page 26, line 19; Figs. 1, 7-8. The method includes acquiring (*e.g.*, 64) a set of motion data (*e.g.*, 72) for a respiratory organ of interest from at least one or more electrical sensors (*e.g.*, 42). *See e.g., id.* at page 4, line 27 – page 5, line 4; page 12, lines 15-27; page 15, lines 15-22; Figs. 1-2. The method further includes processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for the respiratory organ of interest. *See e.g., id.* at page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. The method further includes acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the respiratory organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 20-22; Figs. 7-8. The method further includes reconstructing (*e.g.*, 140) the set of image data (*e.g.*, 118) to generate a set of reconstructed data (*e.g.*, 142). *See e.g., id.* at page 25, lines 1-6. Additionally, the method includes processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 23 – page 25, line 23; Figs. 7-8. Finally, the method includes displaying or storing an image (*e.g.*, 144) generated (*e.g.*, 146) from the portion of the set of reconstructed data (*e.g.*, 142). *See e.g., id.* at page 10, lines 7-11; page 25, lines 4-12; Figs. 1, 7-8.

Appellants respectfully note that claim 22 recites a corresponding computer program, provided on computer readable media (*e.g.* RAM, magnetic and optical storage devices, etc.) and adapted to perform the method recited by claim 21. *See e.g., id.* at page 10, lines 17-25. With regard to the aspect of the invention set forth in independent claim 22, discussions of the recited features of claim 22 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 22 provides a computer program, provided on one or more computer readable media, for imaging (*e.g.*, processing steps 138, 154) an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-31; Figs. 1, 7-8. The computer program includes a routine for acquiring (*e.g.*, 64) a set of motion data (*e.g.*, 72) for a respiratory organ of interest from at least one or more electrical sensors (*e.g.*, 42). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 12, line 29 – page 13, line 26; page 15, lines 15-22; Figs. 1-2. The computer program further includes a routine for processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for the respiratory organ of interest. *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. The computer program further includes a routine for acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the respiratory organ of interest based on the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-22; Figs. 7-8. Additionally, the computer program includes a routine for reconstructing (*e.g.*, 140) the set of image data to generate a set of reconstructed data (*e.g.*, 142). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 23 – page 25, line 23; Figs. 7-8. Finally, the computer program includes a routine for processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 23 – page 25, line 23; Figs. 7-8.

Appellants respectfully note that claim 23 recites an imaging system adapted to perform the method recited by claim 21. With regard to the aspect of the invention set forth in independent claim 23, discussions of the recited features of claim 23 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 23 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes an imager (*e.g.*, 12) configured to generate a plurality of signals (*e.g.*, 54, 58) representative of a region of interest. *See e.g., id.* at page 9, lines 1-27; page 14, line 3 – page 15, line 13; Figs. 1-2. The imaging system (*e.g.*, 10) further includes data acquisition circuitry (*e.g.*, 18) configured to acquire the plurality of signals. *See e.g., id.* at page 9, lines 20-27; Fig. 1. The imaging system (*e.g.*, 10) further includes data processing circuitry (*e.g.*, 20) configured to receive the plurality of signals, to process a set of motion data (*e.g.*, 72) describing the motion of a respiratory organ of interest to derive two or more retrospective gating points (*e.g.*, 110), to reconstruct the plurality of signals to generate a set of reconstructed data (*e.g.*, 142), and to process (*e.g.*, 148) a portion of the reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating signals (*e.g.*, 110). *See e.g., id.* at page 9, line 29 – page 10, line 11; page 15, lines 15-22; page 25, lines 1-23; Figs. 1, 4, 6-8. The imaging system (*e.g.*, 10) further includes system control circuitry (*e.g.*, 16) configured to operate at least one of the imager (*e.g.*, 12) and the data acquisition circuitry (*e.g.*, 18) based upon two or more prospective gating points (*e.g.*, 110) derived from the set of motion data (*e.g.*, 72). *See e.g., id.* at page 9, lines 20-27; page 21, lines 11-14; page 24, lines 20-22; Figs 1, 5, 7-8. Additionally, the imaging system (*e.g.*, 10) includes an operator workstation (*e.g.*, 22) configured to communicate with the system control circuitry (*e.g.*, 16) and to receive at least the processed portion of the plurality of signals from the data processing circuitry (*e.g.*, 20). *See e.g., id.* at page 9, line 29 to page 11, line 11; Fig. 1. Finally, the imaging system (*e.g.*, 10) includes a sensor-based motion measurement system (*e.g.*, 40) configured to measure electrical activity (*e.g.*, 40, 42, 62, 64) indicative of the motion of the respiratory organ of interest to contribute to the set of motion data (*e.g.*, 72). *See e.g., id.* at page 12, line 29 – page 13, line 4; page 15, line 15 – page 16, line 2; Figs. 1-2.

Appellants respectfully note that claim 24 recites an imaging system adapted to perform the method recited by claim 21. With regard to the aspect of the invention set forth in independent claim 24, discussions of the recited features of claim 24 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 24 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes means (*e.g.*, data acquisition circuitry 18, motion determination system 34, sensors 36) or acquiring (*e.g.*, 68) a set of motion data (*e.g.*, 72) for a respiratory organ from at least one or more electrical sensors (*e.g.*, 42). *See e.g., id.* at page 9, lines 20-27; page 11, line 27 – page 13, line 26; page 15, line 15 – page 16, line 2; Figs. 1-2. The imaging system (*e.g.*, 10) further includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 154) the set of motion data to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for the respiratory organ of interest. *See e.g., id.* at page 9, line 29 to page 11, line 11; page 15, lines 15-22; page 18, lines 7-18; Figs. 1, 4. The imaging system (*e.g.*, 10) further includes means (*e.g.*, imager 12, data processing circuitry 20, operator workstation 22) for acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the respiratory organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, line 1 – page 11, line 11; page 14, line 3 – page 15, line 22; page 24, lines 20-22; Figs. 1, 7-8. Additionally, the imaging system (*e.g.*, 10) includes means for reconstructing (*e.g.*, data processing circuitry 20, operator workstation 22) the set of image data (*e.g.*, 118) to generate a set of reconstructed data (*e.g.*, 142). *See e.g., id.* at page 9, line 29 – page 11, line 11; page 25, lines 1-6; Figs. 1, 7-8. Finally, the imaging system (*e.g.*, 10) includes means for processing (*e.g.*, data processing circuitry 20, operator workstation 22) a portion (*e.g.*, 142) of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, line 29 – page 11, line 11; page 25, lines 14-23; Figs. 1, 7-8.

Claims 25-32

As noted above, claims 25-32 recite similar subject matter, wherein claims 25-28 are directed towards a method, a computer program, and imaging systems in accordance with one aspect of the invention, and wherein claims 29-32 are directed towards a method, a computer program, and imaging systems in accordance with a further aspect of the invention, as will be summarized below.

Independent Claims 25-28

With regard to the aspect of the invention set forth in independent claim 25, discussions of the recited features of claim 25 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 25 provides a method for imaging an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 24, line 20 – page 26, line 19; Figs. 1, 7-8. The method includes acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for an organ of interest from one or more non-electrical sensors (*e.g.*, 46) and one or more electrical sensors (*e.g.*, 42). *See e.g., id.* at page 5, lines 6-13; page 12, line 15 – page 13, line 26; Figs. 1-2. The method further includes processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for the organ of interest. *See e.g., id.* at page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. The method further includes acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 20-22; Figs. 7-8. Additionally, the method includes processing (*e.g.*, 148) a portion of the set of image data (*e.g.*, 118) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 23 – page 25, line 23; Figs. 7-8. Finally, the method includes displaying or storing an image (*e.g.*, 144) generated (*e.g.*, 146) from the portion of the set of image data (*e.g.*, 118). *See e.g., id.* at page 10, lines 7-11; page 25, lines 4-12; Figs. 1, 7-8.

Appellants respectfully note that claim 26 recites a corresponding computer program, provided on computer readable media (*e.g.* RAM, magnetic and optical storage devices, etc.) and adapted to perform the method recited by claim 25. *See e.g., id.* at page 10, lines 17-25. With regard to the aspect of the invention set forth in independent claim 26, discussions of the recited features of claim 26 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 26 provides a computer program, provided on one or more computer readable media, for imaging (*e.g.*, processing steps 138, 154) an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-31; Figs. 1, 7-8. The computer program includes a routine for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for an organ of interest from one or more of non-electrical sensors (*e.g.*, 46) and one or more electrical sensors (*e.g.,* 42). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 3, lines 10-17; page 12, line 15 – page 13, line 26; Figs. 1-2. The computer program further includes a routine for processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for the organ of interest. *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. Additionally, the computer program includes a routine for acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-22; Figs. 7-8. Finally, the computer program includes a routine for processing (*e.g.*, 148) a portion of the set of image data (*e.g.*, 118) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 23 – page 25, line 23; Figs. 7-8.

Appellants respectfully note that claim 27 recites an imaging system adapted to perform the method recited by claim 25. With regard to the aspect of the invention set forth in independent claim 27, discussions of the recited features of claim 27 can be found at least in the below cited locations of the specification and drawings. By way of

example, an exemplary embodiment of claim 27 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes an imager (*e.g.*, 12) configured to generate a plurality of signals (*e.g.*, 54, 58) representative of a region of interest. *See e.g., id.* at page 9, lines 1-27; page 14, line 3 – page 15, line 13; Figs. 1-2. The imaging system (*e.g.*, 10) further includes data acquisition circuitry (*e.g.*, 18) configured to acquire the plurality of signals. *See e.g., id.* at page 9, lines 20-27; Fig. 1. The imaging system (*e.g.*, 10) further includes data processing circuitry (*e.g.*, 20) configured to receive the plurality of signals, to process a set of motion data (*e.g.*, 72) describing the motion of an organ of interest to derive two or more retrospective gating points (*e.g.*, 110) for the organ, and to process a portion of the plurality of signals based upon the two or more retrospective gating signals (*e.g.*, 110). *See e.g., id.* at page 9, line 29 – page 10, line 11; Figs. 1, 4, 6-8. The imaging system (*e.g.*, 10) further includes system control circuitry (*e.g.*, 16) configured to operate at least one of the imager (*e.g.*, 12) and the data acquisition circuitry (*e.g.*, 18) based upon two or more prospective gating points (*e.g.*, 110) derived from the set of motion data (*e.g.*, 72). *See e.g., id.* at page 9, lines 20-27; page 21, lines 11-14; page 24, lines 20-22; Figs 1, 5, 7-8. The imaging system (*e.g.,* 10) further includes an operator workstation (*e.g.*, 22) configured to communicate with the system control circuitry (*e.g.*, 16) and to receive at least the processed portion of the plurality of signals from the data processing circuitry (*e.g.*, 20). *See e.g., id.* at page 9, line 29 to page 11, line 11; Fig. 1. Additionally, the imaging system (*e.g.,* 10) includes a sensor-based motion measurement system (*e.g.*, 34) configured to measure non-electrical activity (*e.g.* 44, 46, 66, 68) indicative of the motion of the organ of interest to contribute to the set of motion data (*e.g.*, 72). *See e.g., id.* at page 11, line 27 – page 12, line 4; page 12, line 29 – page 13, line 26; page 15, line 15 – page 16, line 2; Figs. 1-2. Finally, the imaging system (*e.g.,* 10) includes a sensor-based motion measurement system (*e.g.*, 34) configured to measure electrical (*e.g.*, 40, 42, 62, 64) activity indicative of the motion of the organ of interest to contribute to the set of motion data (*e.g.*, 72). *See e.g., id.* at page 11, line 27 – page 12, line 27; page 15, line 15 – page 16, line 2; Figs. 1-2.

Appellants respectfully note that claim 28 recites an imaging system adapted to perform the method recited by claim 25. With regard to the aspect of the invention set forth in independent claim 28, discussions of the recited features of claim 28 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 28 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes means (*e.g.*, data acquisition circuitry 18, motion determination system 34, sensors 36) for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for an organ from at one or more non-electrical sensors (*e.g.*, 46) and one or more electrical sensors (*e.g.*, 42). *See e.g., id.* at page 9, lines 20-27; page 11, line 27 – page 13, line 26; page 15, line 15 – page 16, line 2; Figs. 1-2. The imaging system (*e.g.*, 10) further includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 154) the set of motion data to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for the organ of interest. *See e.g., id.* at page 9, line 29 to page 11, line 11; page 18, lines 7-18; Figs. 1, 4. Additionally, the imaging system (*e.g.*, 10) includes means (*e.g.*, imager 12) for acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 1-27; page 14, line 3 – page 15, line 13; page 24, lines 20-22; Figs. 1, 7-8. Finally, the imaging system (*e.g.*, 10) includes means for processing (*e.g.*, data processing circuitry 20, operator workstation 22) a portion (*e.g.*, 142) of the set of image data (*e.g.*, 118) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, line 29 – page 11, line 11; page 25, lines 14-23; Figs. 1, 7-8.

Independent Claims 29-32

With regard to the aspect of the invention set forth in independent claim 29, discussions of the recited features of claim 29 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 29 provides a method for imaging an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 24, line 20 – page 26, line 19; Figs. 1, 7-8. The method

includes acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for an organ of interest from one or more non-electrical sensors (*e.g.*, 46) and one or more electrical sensors (*e.g.*, 42). *See e.g., id.* at page 5, lines 6-13; page 12, line 15 – page 13, line 26; Figs. 1-2. The method further includes processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for the organ of interest. *See e.g., id.* at page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. The method further includes acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 20-22; Figs. 7-8. The method further includes reconstructing (*e.g.*, 140) the set of image data (*e.g.*, 118) to generate a set of reconstructed data (*e.g.*, 142). *See e.g., id.* at page 25, lines 1-6. Additionally, the method includes processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 23 – page 25, line 23; Figs. 7-8. Finally, the method includes displaying or storing an image (*e.g.*, 144) generated (*e.g.*, 146) from the portion of the set of reconstructed data (*e.g.*, 142). *See e.g., id.* at page 10, lines 7-11; page 25, lines 4-12; Figs. 1, 7-8.

Appellants respectfully note that claim 30 recites a corresponding computer program, provided on computer readable media (*e.g.* RAM, magnetic and optical storage devices, etc.) and adapted to perform the method recited by claim 29. *See e.g., id.* at page 10, lines 17-25. With regard to the aspect of the invention set forth in independent claim 30, discussions of the recited features of claim 30 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 30 provides a computer program, provided on one or more computer readable media, for imaging (*e.g.*, processing steps 138, 154) an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-31; Figs. 1, 7-8. The computer program includes a routine for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for an organ of interest from one or more of non-

electrical sensors (*e.g.*, 46) and one or more electrical sensors (*e.g.,* 42). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 3, lines 10-17; page 12, line 15 – page 13, line 26; Figs. 1-2. The computer program further includes a routine for processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for the organ of interest. *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. Additionally, the computer program includes a routine for acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-22; Figs. 7-8. Additionally, the computer program includes a routine for reconstructing (*e.g.*, 140) the set of image data to generate a set of reconstructed data (*e.g.*, 142). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 23 – page 25, line 23; Figs. 7-8. Finally, the computer program includes a routine for processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 23 – page 25, line 23; Figs. 7-8.

Appellants respectfully note that claim 31 recites an imaging system adapted to perform the method recited by claim 29. With regard to the aspect of the invention set forth in independent claim 31, discussions of the recited features of claim 31 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 31 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes an imager (*e.g.*, 12) configured to generate a plurality of signals (*e.g.*, 54, 58) representative of a region of interest. *See e.g., id.* at page 9, lines 1-27; page 14, line 3 – page 15, line 13; Figs. 1-2. The imaging system (*e.g.*, 10) further includes data acquisition circuitry (*e.g.*, 18) configured to acquire the plurality of signals. *See e.g., id.* at page 9, lines 20-27; Fig. 1. The imaging system (*e.g.*, 10) further includes data processing circuitry (*e.g.*, 20) configured to receive the plurality of signals, to process a set of motion data (*e.g.*, 72) describing the

motion of an organ of interest to derive two or more retrospective gating points (*e.g.*, 110), to reconstruct the plurality of signals to generate a set of reconstructed data (*e.g.*, 142), and to process (*e.g.*, 148) a portion of the reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating signals (*e.g.*, 110). *See e.g., id.* at page 9, line 29 – page 10, line 11; page 15, lines 15-22; page 25, lines 1-23; Figs. 1, 4, 6-8. The imaging system (*e.g.*, 10) further includes system control circuitry (*e.g.*, 16) configured to operate at least one of the imager (*e.g.*, 12) and the data acquisition circuitry (*e.g.*, 18) based upon two or more prospective gating points (*e.g.*, 110) derived from the set of motion data (*e.g.*, 72). *See e.g., id.* at page 9, lines 20-27; page 21, lines 11-14; page 24, lines 20-22; Figs 1, 5, 7-8. The imaging system (*e.g.,* 10) further includes an operator workstation (*e.g.*, 22) configured to communicate with the system control circuitry (*e.g.*, 16) and to receive at least the processed portion of the plurality of signals from the data processing circuitry (*e.g.*, 20). *See e.g., id.* at page 9, line 29 to page 11, line 11; Fig. 1. Additionally, the imaging system (*e.g.,* 10) includes a sensor-based motion measurement system (*e.g.*, 34) configured to measure non-electrical activity (*e.g.* 44, 46, 66, 68) indicative of the motion of the organ of interest to contribute to the set of motion data (*e.g.*, 72). *See e.g., id.* at page 11, line 27 – page 12, line 4; page 12, line 29 – page 13, line 26; page 15, line 15 – page 16, line 2; Figs. 1-2. Finally, the imaging system (*e.g.,* 10) includes a sensor-based motion measurement system (*e.g.*, 34) configured to measure electrical (*e.g.*, 40, 42, 62, 64) activity indicative of the motion of the organ of interest to contribute to the set of motion data (*e.g.*, 72). *See e.g., id.* at page 11, line 27 – page 12, line 27; page 15, line 15 – page 16, line 2; Figs. 1-2.

Appellants respectfully note that claim 32 recites an imaging system adapted to perform the method recited by claim 29. With regard to the aspect of the invention set forth in independent claim 32, discussions of the recited features of claim 32 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 32 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes means

(*e.g.*, data acquisition circuitry 18, motion determination system 34, sensors 36) for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for an organ from at one or more non-electrical sensors (*e.g.*, 46) and one or more electrical sensors (*e.g.*, 42). *See e.g., id.* at page 9, lines 20-27; page 11, line 27 – page 13, line 26; page 15, line 15 – page 16, line 2; Figs. 1-2. The imaging system (*e.g.*, 10) further includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 154) the set of motion data to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for the organ of interest. *See e.g., id.* at page 9, line 29 to page 11, line 11; page 18, lines 7-18; Figs. 1, 4. The imaging system (*e.g.*, 10) further includes means (*e.g.*, imager 12) for acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 1-27; page 14, line 3 – page 15, line 13; page 24, lines 20-22; Figs. 1, 7-8. Additionally, the imaging system (*e.g.*, 10) includes means for reconstructing (*e.g.*, data processing circuitry 20, operator workstation 22) the set of image data (*e.g.*, 118) to generate a set of reconstructed data (*e.g.*, 142). *See e.g., id.* at page 9, line 29 – page 11, line 11; page 25, lines 1-6; Figs. 1, 7-8. Finally, the imaging system (*e.g.*, 10) includes means for processing (*e.g.*, data processing circuitry 20, operator workstation 22) a portion (*e.g.*, 142) of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, line 29 – page 11, line 11; page 25, lines 14-23; Figs. 1, 7-8.

<u>Claims 33-40</u>

As noted above, claims 33-40 recite similar subject matter, wherein claims 33-36 are directed towards a method, a computer program, and imaging systems in accordance with one aspect of the invention, and wherein claims 36-40 are directed towards a method, a computer program, and imaging systems in accordance with a further aspect of the invention, as will be summarized below.

Independent Claims 33-36

With regard to the aspect of the invention set forth in independent claim 33, discussions of the recited features of claim 33 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 33 provides a method for imaging an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 24, line 20 – page 26, line 19; Figs. 1, 7-8. The method includes acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for one or more organs from at least one of one or more types of electrical sensors (*e.g.*, 42) and one or more types of non-electrical sensors (*e.g.*, 46). *See e.g., id.* at page 3, lines 10-17; page 12, line 15 – page 13, line 26; Figs. 1-2. The method further includes processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for an organ of interest. *See e.g., id.* at page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. The method further includes acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 20-22; Figs. 7-8. The method further includes processing (*e.g.*, 148) a portion of the set of image data (*e.g.*, 118) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 23 – page 25, line 23; Figs. 7-8. Additionally, the method includes compensating (*e.g.*, 158) for motion in the portion of the set of image data (*e.g.*, 118) based upon a set of motion compensation factors (*e.g.*, 106) derived from one or more pre-acquisition images. *See id.* at page 19, lines 23-27; page 25, line 25 – page 26, line 19; Figs. 4, 8. Finally, the method includes displaying or storing an image (*e.g.*, 144) generated (*e.g.*, 146) from the portion of the set of image data (*e.g.*, 118). *See e.g., id.* at page 10, lines 7-11; page 25, lines 4-12; Figs. 1, 7-8.

Appellants respectfully note that claim 34 recites a corresponding computer program, provided on computer readable media (*e.g.* RAM, magnetic and optical storage devices, etc.) and adapted to perform the method recited by claim 33. *See e.g., id.* at page 10, lines 17-25. With regard to the aspect of the invention set forth in independent claim

34, discussions of the recited features of claim 34 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 34 provides a computer program, provided on one or more computer readable media, for imaging (*e.g.*, processing steps 138, 154) an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-31; Figs. 1, 7-8. The computer program includes a routine for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for one or more organs from at least one of one or more types of electrical sensors (*e.g.,* 42) and one or more types of non-electrical sensors (*e.g.*, 46). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 3, lines 10-17; page 12, line 15 – page 13, line 26; Figs. 1-2. The computer program further includes a routine for processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for an organ of interest. *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. The computer program further includes a routine for acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-22; Figs. 7-8. Additionally, the computer program includes a routine for processing (*e.g.*, 148) a portion of the set of image data (*e.g.*, 118) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 23 – page 25, line 23; Figs. 7-8. Finally, the computer program includes a routine for compensating for motion (*e.g.*, 158) in the portion (*e.g.*, 138) of the set of image data (*e.g.*, 118) based upon a set of motion compensation factors (*e.g.*, 106) derived from one or more pre-acquisition images. *See id.* at page 9, lines 9-18; page 10, lines 17-25; page 19, lines 23-27; page 25, line 25 – page 26, line 19; Figs. 4, 8.

Appellants respectfully note that claim 35 recites an imaging system adapted to perform the method recited by claim 33. With regard to the aspect of the invention set forth in independent claim 35, discussions of the recited features of claim 35 can be found

at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 35 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes an imager (*e.g.*, 12) configured to generate a plurality of signals (*e.g.*, 54, 58) representative of a region of interest. *See e.g., id.* at page 9, lines 1-27; page 14, line 3 – page 15, line 13; Figs. 1-2. The imaging system (*e.g.*, 10) further includes data acquisition circuitry (*e.g.*, 18) configured to acquire the plurality of signals. *See e.g., id.* at page 9, lines 20-27; Fig. 1. The imaging system (*e.g.*, 10) further includes data processing circuitry (*e.g.*, 20) configured to receive the plurality of signals, to process a set of motion data (*e.g.*, 72) describing the motion of one or more organs to derive two or more retrospective gating points (*e.g.*, 110) for at least one of the organs, and to process a portion of the plurality of signals based upon the two or more retrospective gating signals (*e.g.*, 110), and to compensate for motion (*e.g.*, 158) in the portion (*e.g.*, 138) of the set of image data (*e.g.*, 118) based upon a set of motion compensation factors (*e.g.*, 106) derived from one or more pre-acquisition images. *See e.g., id.* at page 9, line 29 – page 10, line 11; page 19, lines 23-27; page 25, line 25 – page 26, line 19; Figs. 1, 4, 6-8. The imaging system (*e.g.*, 10) further includes system control circuitry (*e.g.*, 16) configured to operate at least one of the imager (*e.g.*, 12) and the data acquisition circuitry (*e.g.*, 18) based upon two or more prospective gating points (*e.g.*, 110) derived from the set of motion data (*e.g.*, 72). *See e.g., id.* at page 9, lines 20-27; page 21, lines 11-14; page 24, lines 20-22; Figs 1, 5, 7-8. Additionally, the imaging system (*e.g.*, 10) includes an operator workstation (*e.g.*, 22) configured to communicate with the system control circuitry (*e.g.*, 16) and to receive at least the processed portion of the plurality of signals from the data processing circuitry (*e.g.*, 20). *See e.g., id.* at page 9, line 29 to page 11, line 11; Fig. 1. Finally, the imaging system (*e.g.,* 10) includes a sensor-based motion measurement system (*e.g.*, 34) configured to measure electrical (*e.g.*, 40, 42, 62, 64) or non-electrical activity (*e.g.*, 44, 46, 66, 68) indicative of the motion of the one or more organs within the region of interest to contribute to the set of motion data (*e.g.*, 72). *See e.g., id.* at page 11, line 27 – page 13, line 4; page 15, line 15 – page 16, line 2; Figs. 1-2.

Appellants respectfully note that claim 36 recites an imaging system adapted to perform the method recited by claim 33. With regard to the aspect of the invention set forth in independent claim 36, discussions of the recited features of claim 36 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 36 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes means (*e.g.*, data acquisition circuitry 18, motion determination system 34, sensors 36) for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for one or more organs from at least one of one or more types of electrical sensors (*e.g.*, 42) and one or more types of non-electrical sensors (*e.g.*, 46). *See e.g., id.* at page 9, lines 20-27; page 11, line 27 – page 13, line 26; page 15, line 15 – page 16, line 2; Figs. 1-2. The imaging system (*e.g.*, 10) further includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 154) the set of motion data to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for an organ of interest. *See e.g., id.* at page 9, line 29 to page 11, line 11; page 18, lines 7-18; Figs. 1, 4. The imaging system (*e.g.*, 10) includes means (*e.g.*, imager 12) for acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 1-27; page 14, line 3 – page 15, line 13; page 24, lines 20-22; Figs. 1, 7-8. Additionally, the imaging system (*e.g.*, 10) includes means for processing (*e.g.*, data processing circuitry 20, operator workstation 22) a portion (*e.g.*, 142) of the set of image data (*e.g.*, 118) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, line 29 – page 11, line 11; page 25, lines 14-23; Figs. 1, 7-8. Finally, the imaging system (*e.g.*, 10) includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for compensating for motion (*e.g.*, 158) in the portion (*e.g.*, 138) of the set of image data (*e.g.*, 118) based upon a set of motion compensation factors (*e.g.*, 106) derived from one or more pre-acquisition images. *See e.g., id.* at page 9, line 29 – page 11, line 11; page 19, lines 23-27; page 25, line 25 – page 26, line 19; Figs. 1, 4, 8.

Independent Claims 37-40

With regard to the aspect of the invention set forth in independent claim 37, discussions of the recited features of claim 37 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 37 provides a method for imaging an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 24, line 20 – page 26, line 19; Figs. 1, 7-8. The method includes acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for one or more organs from at least one of one or more types of electrical sensors (*e.g.*, 42) and one or more types of non-electrical sensors (*e.g.*, 46). *See e.g., id.* at page 3, lines 10-17; page 12, line 15 – page 13, line 26; Figs. 1-2. The method further includes processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for an organ of interest. *See e.g., id.* at page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. The method further includes acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 20-22; Figs. 7-8. The method further includes reconstructing (*e.g.*, 140) the set of image data (*e.g.*, 118) to generate a set of reconstructed data (*e.g.*, 142). *See e.g., id.* at page 25, lines 1-6. The method further includes processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 24, lines 23 – page 25, line 23; Figs. 7-8. Additionally, the method includes compensating (*e.g.*, 158) for motion in the portion (*e.g.*, 148) of the set of reconstructed data (*e.g.*, 142) based upon a set of motion compensation factors (*e.g.*, 106) derived from one or more pre-acquisition images. *See id.* at page 19, lines 23-27; page 25, line 25 – page 26, line 19; Figs. 4, 8. Finally, the method includes displaying or storing an image (*e.g.*, 144) generated (*e.g.*, 146) from the portion of the set of image data (*e.g.*, 118). *See e.g., id.* at page 10, lines 7-11; page 25, lines 4-12; Figs. 1, 7-8.

Appellants respectfully note that claim 38 recites a corresponding computer program, provided on computer readable media (*e.g.* RAM, magnetic and optical storage devices, etc.) and adapted to perform the method recited by claim 37. *See e.g., id.* at page 10, lines 17-25. With regard to the aspect of the invention set forth in independent claim 38, discussions of the recited features of claim 38 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 38 provides a computer program, provided on one or more computer readable media, for imaging (*e.g.*, processing steps 138, 154) an organ (*e.g.*, organ belonging to patient 14). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-31; Figs. 1, 7-8. The computer program includes a routine for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for one or more organs from at least one of one or more types of electrical sensors (*e.g.,* 42) and one or more types of non-electrical sensors (*e.g.*, 46). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 3, lines 10-17; page 12, line 15 – page 13, line 26; Figs. 1-2. The computer program further includes a routine for processing (*e.g.*, 154) the set of motion data (*e.g.*, 72) to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for an organ of interest. *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 19, line 17 – page 20, line 16; page 21, line 20 – page 22, line 19; Figs. 3-6. The computer program further includes a routine for acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 20-22; Figs. 7-8. The computer program further includes a routine for reconstructing (*e.g.*, 140) the set of image data to generate a set of reconstructed data (*e.g.*, 142). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 23 – page 25, line 23; Figs. 7-8. Additionally, the computer program includes a routine for processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 9-18; page 10, lines 17-25; page 24, lines 23 – page 25, line 23; Figs. 7-8. Finally, the computer program includes a routine for compensating for motion (*e.g.*, 158) in the portion (*e.g.*, 148) of the set of reconstructed data (*e.g.*, 142) based

upon a set of motion compensation factors (*e.g.*, 106) derived from one or more pre-acquisition images. *See id.* at page 9, lines 9-18; page 10, lines 17-25; page 19, lines 23-27; page 25, line 25 – page 26, line 19; Figs. 4, 8.

Appellants respectfully note that claim 39 recites an imaging system adapted to perform the method recited by claim 37. With regard to the aspect of the invention set forth in independent claim 39, discussions of the recited features of claim 39 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 39 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes an imager (*e.g.*, 12) configured to generate a plurality of signals (*e.g.*, 54, 58) representative of a region of interest. *See e.g., id.* at page 9, lines 1-27; page 14, line 3 – page 15, line 13; Figs. 1-2. The imaging system (*e.g.*, 10) further includes data acquisition circuitry (*e.g.*, 18) configured to acquire the plurality of signals. *See e.g., id.* at page 9, lines 20-27; Fig. 1. The imaging system (*e.g.*, 10) further includes data processing circuitry (*e.g.*, 20) configured to receive the plurality of signals, to process a set of motion data (*e.g.*, 72) describing the motion of one or more organs of interest to derive two or more retrospective gating points (*e.g.*, 110) for at least one of the organs, to reconstruct the plurality of signals to generate a set of reconstructed data (*e.g.*, 142), and to process (*e.g.*, 148) a portion of the reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating signals (*e.g.*, 110), and to compensate for motion (*e.g.*, 158) in the portion (*e.g.*, 148) of the set of reconstructed data (*e.g.*, 142) based upon a set of motion compensation factors (*e.g.*, 106) derived from one or more pre-acquisition images. *See e.g., id.* at page 9, line 29 – page 10, line 11; page 15, lines 15-22; page 25, line 1 – page 26, line 19; Figs. 1, 4, 6-8. The imaging system (*e.g.*, 10) further includes system control circuitry (*e.g.*, 16) configured to operate at least one of the imager (*e.g.*, 12) and the data acquisition circuitry (*e.g.*, 18) based upon two or more prospective gating points (*e.g.*, 110) derived from the set of motion data (*e.g.*, 72). *See e.g., id.* at page 9, lines 20-27; page 21, lines 11-14; page 24, lines 20-22; Figs 1, 5, 7-8. Additionally, the imaging system (*e.g.,* 10) includes an operator workstation (*e.g.*, 22)

configured to communicate with the system control circuitry (*e.g.*, 16) and to receive at least the processed portion of the plurality of signals from the data processing circuitry (*e.g.*, 20). *See e.g., id.* at page 9, line 29 to page 11, line 11; Fig. 1. Finally, the imaging system (*e.g.*, 10) includes a sensor-based motion measurement system (*e.g.*, 34) configured to measure electrical (*e.g.*, 40, 42, 62, 64) or non-electrical activity (*e.g.*, 44, 46, 66, 68) indicative of the motion of the one or more organs within the region of interest to contribute to the set of motion data (*e.g.*, 72). *See e.g., id.* at page 11, line 27 – page 13, line 4; page 15, line 15 – page 16, line 2; Figs. 1-2.

Appellants respectfully note that claim 40 recites an imaging system adapted to perform the method recited by claim 37. With regard to the aspect of the invention set forth in independent claim 40, discussions of the recited features of claim 40 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 40 provides an imaging system (*e.g.*, 10). *See e.g., id.* at page 9, lines 1-7; Fig. 1. The imaging system (*e.g.*, 10) includes means (*e.g.*, data acquisition circuitry 18, motion determination system 34, sensors 36) for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for one or more organs from at least one of one or more types of electrical sensors (*e.g.*, 42) and one or more types of non-electrical sensors (*e.g.*, 46). *See e.g., id.* at page 9, lines 20-27; page 11, line 27 – page 13, line 26; page 15, line 15 – page 16, line 2; Figs. 1-2. The imaging system (*e.g.*, 10) further includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 154) the set of motion data to extract two or more prospective gating points (*e.g.*, 110) and two or more retrospective gating points (*e.g.*, 110) for an organ of interest. *See e.g., id.* at page 9, line 29 to page 11, line 11; page 18, lines 7-18; Figs. 1, 4. The imaging system (*e.g.*, 10) includes means (*e.g.*, imager 12) for acquiring (*e.g.*, 116) a set of image data (*e.g.*, 118) representative of the organ of interest using the two or more prospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, lines 1-27; page 14, line 3 – page 15, line 13; page 24, lines 20-22; Figs. 1, 7-8. The imaging system (*e.g.*, 10) further includes means for reconstructing (*e.g.*, data processing circuitry 20, operator workstation

22) the set of image data (*e.g.*, 118) to generate a set of reconstructed data (*e.g.*, 142). *See e.g., id.* at page 9, line 29 – page 11, line 11; page 25, lines 1-6; Figs. 1, 7-8. Additionally, the imaging system (*e.g.*, 10) includes means for processing (*e.g.*, data processing circuitry 20, operator workstation 22) a portion (*e.g.*, 142) of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110). *See e.g., id.* at page 9, line 29 – page 11, line 11; page 25, lines 14-23; Figs. 1, 7-8. Finally, the imaging system (*e.g.*, 10) includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for compensating for motion (*e.g.*, 158) in the portion (*e.g.*, 138) of the set of reconstructed data (*e.g.*, 142) based upon a set of motion compensation factors (*e.g.*, 106) derived from one or more pre-acquisition images. *See e.g., id.* at page 9, line 29 – page 11, line 11; page 19, lines 23-27; page 25, line 25 – page 26, line 19; Figs. 1, 4, 8.

Various benefits of the invention, as recited in these claims, relate to the reduction of motion artifacts in a resulting image when imaging an organ of interest. Accordingly, an imager and multiple sensors (*e.g.*, electrical sensors 42, non-electrical sensors 46) are provided by the technique for acquiring motion data. The sensors may be configured to acquire motion data from one or more organs. The motion data is processed to determine one or more quiescent periods for the organ of interest corresponding to an interval of minimal absolute motion for the organ. By analyzing the quiescent periods, prospective and retrospective gating points, as well as motion compensation factors, may be extracted and applied to the imaging process in order to generate images having reduced motion artifacts. At least these features are believed to be distinct from the prior art relied upon by the Examiner, as will be discussed in further detail below.

6. <u>GROUND OF REJECTION TO BE REVIEWED ON APPEAL</u>

Appellants respectfully urge the Board to review and reverse the Examiner's sole ground of rejection in which the Examiner rejected claims 1-40 under 35 U.S.C. § 102(b) as being anticipated by the publication entitled, *"Preliminary Studies of Cardiac Motion*

in Positron Emission Tomography," by Huesman et al. (hereinafter "the Huesman reference").

7. **ARGUMENT**

As discussed in detail below, the Examiner has improperly rejected the pending claims. Moreover, the Examiner has misapplied long-standing and binding legal precedents and principles in rejecting the claims under Section 102. Accordingly, Appellants respectfully requests full and favorable consideration by the Board, as Appellants strongly believe that claims 1-40 are in condition for allowance.

As a preliminary matter, Appellants also note that the Examiner provisionally rejected claims 1-40 on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-32 of the co-pending U.S. Patent Application Serial No. 10/723,894 in view of the Huesman reference. *See* Final Office Action mailed February 5, 2008, pages 2-3. Although this issue is provisional and is therefore not considered ripe for appeal, it should be noted that Appellants do not necessarily agree with the Examiner's assertion, but may be amenable to filing a terminal disclaimer upon allowance of the claims in the present application. As the Board will appreciate, any such filing will depend on the prosecution and state of these claims at the time of allowance. For instance, depending on the Board's decision in the present Appeal, as well as any subsequent prosecution of the present application, the claims which are ultimately allowed may be *significantly* different from their present form. Thus, it is quite possible that the Examiner's double-patenting rejection may no longer be proper or applicable with regard to the claims which ultimately issue. Accordingly, Appellants respectfully request that the Board and the Examiner hold in abeyance the double-patenting rejection until the present claims are determined to be allowable.

Sole Ground of Rejection

Claims 1-40 were rejected by the Examiner under 35 U.S.C. §102(b) as being anticipated by the Huesman reference. As noted above, claims 1-40 are all independent. Appellants respectfully traverse this rejection. For the Board's convenience, Appellants have organized the following discussion into different sections based upon (1) the applicable legal precedent and (2) the numerous deficiencies of the Huesman reference.

1. **Judicial precedent has clearly established a legal standard for a *prima facie* anticipation rejection under 35 U.S.C. §102.**

Anticipation under Section 102 can be found only if a single reference shows exactly what is claimed. *See Titanium Metals Corp. v. Banner*, 227 U.S.P.Q. 773 (Fed. Cir.1985). For a prior art reference to anticipate under Section 102, every element of the claimed invention must be identically shown in a single reference. *See In re Bond*, 15 U.S.P.Q.2d 1566 (Fed. Cir.1990). That is, the prior art reference must show the *identical invention "in as complete detail as contained in the ... claim"* to support a *prima facie* case of anticipation. *Richardson v. Suzuki Motor Co*., 9 U.S.P.Q. 2d 1913, 1920 (Fed. Cir. 1989) (emphasis added). Thus, for anticipation, the cited reference must not only disclose all of the recited features but must also disclose the *part-to-part relationships* between these features. *See Lindermann Maschinenfabrik GMBH v. American Hoist & Derrick*, 221 U.S.P.Q. 481, 486 (Fed. Cir.1984). Accordingly, Appellants need only point to a single element or claimed relationship not found in the cited reference to demonstrate that the cited reference fails to anticipate the claimed subject matter. A *strict correspondence* between the claimed language and the cited reference must be established for a valid anticipation rejection.

Moreover, the Appellants submit that, during patent examination, the pending claims must be given an interpretation that is *reasonable* and *consistent* with the specification. *See In re Prater*, 162 U.S.P.Q. 541, 550-51 (C.C.P.A. 1969); *In re Morris*, 44 U.S.P.Q.2d 1023, 1027-28 (Fed. Cir. 1997); *see also* M.P.E.P. §2111 (describing the

standards for claim interpretation during prosecution). Indeed, the *specification* is "the primary basis for construing the claims." *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005). (Emphasis added). It is usually dispositive. *See id.* Interpretation of the claims must also be consistent with the interpretation that those skilled in the art would reach. *See In re Cortright*, 49 U.S.P.Q.2d 1464, 1468 (Fed. Cir. 1999); *see also* M.P.E.P. §2111. That is, recitations of a claim must be read as they would be interpreted by those of ordinary skill in the art. *See Rexnord Corp. v. Laliram Corp.*, 60 U.S.P.Q.2d 1851, 1854 (Fed. Cir. 2001); *see also* M.P.E.P. §2111.01. In summary, an Examiner, during prosecution, must interpret a claim recitation as one of ordinary skill in the art would reasonably interpret the claim in view of the specification. *See In re American Academy of Science Tech Center,* 70 U.S.P.Q.2d 1827 (Fed. Cir. 2004).

2. **Independent Claims 5-12, 17-20: The Examiner's use of the Huesman reference to establish a *prima facie* case of anticipation against independent claims 5-12 and 17-20 is improper because the Huesman reference fails to teach or suggest "initiating and terminating the acquisition of a set of image data … based on two or more prospective gating points," as recited by independent claims 5-12 and 17-20.**

As an initial matter, Appellants respectfully direct the Board's attention to the telephonic interview conducted on November 19, 2007, in which Appellants,[1] Appellants' legal representatives,[2] and the Examiner, discussed the failure of the Huesman reference to teach or suggest the *acquisition* of image data *based on* prospective gating points. A full summary of the interview may be found in the previously filed Response to the Office Action mailed August 22, 2007, as well as in the Interview Summary mailed by the Examiner on November 23, 2007.

[1] Gopal Avinash, an inventor of record, participated in the Examiner interview.
[2] John Rariden, Reg. No. 54,388, and Kenneth Liu, attorneys at the law firm of Fletcher Yoder, also participated in the Examiner interview.

During the above-referenced interview, Appellants stressed that although the term "prospective gating" and/or "prospective gates" appear to be used throughout both the present application and the Huesman reference, the Huesman reference does not appear to define "prospective gating" in a manner that is consistent with the present application. *See* Response to the Office Action mailed August 22, 2007, pages 25-26. In particular, Appellants explained to the Examiner that the present application *clearly* defines "prospective gating" as acquiring data *only* during finite intervals defined by prospective gating points. For instance, as set forth in the present application, prospective gating, in one embodiment, may be accomplished by first analyzing motion data to extract gating points corresponding to periods of absolute motion for a region of interest, and then using these extracted gating points to acquire image data, such that the image data is acquired only during intervals defined by the prospective gating points, and thus corresponds to a period of absolute minimal motion for the region of interest. *See* Application, page 19, line 29 to page 20, line 9; Fig. 3. Embodiments of the present invention do not acquire a continuous stream of image data, but rather acquire portions of the image data in an *interrupted* and *non-continuous* manner, such that the acquisition of image data is triggered *only* during the time intervals defined by the extracted prospective gating points, and is otherwise ignored for those intervals outside of the prospective gating intervals. *See* Application, page 19, line 29 to page 20, line 9; Fig. 3.

To the contrary, the Huesman reference, as noted by Appellants during the interview, appears to describe and define "prospective gating" as a technique for binning or classifying a *continuously acquired and uninterrupted* set of image data into various groupings or categories based upon "gating states" which correspond to a particular state of motion that an organ or organs of interest are undergoing at the time the image data is acquired. In other words, although the Huesman reference appears to make use of "gating states" it appears that these gating states are merely used to categorize previously acquired data, not to trigger (*e.g.*, initiate and terminate) the acquisition of data. As such, Appellants

respectfully submit to the Board that these two disparate methods of operation, despite the use of similar terminology, cannot possibly be considered equivalent.

Further, in view of the foregoing distinctions pointed out during the telephone interview, it is noted that the Examiner *acknowledged and appreciated the differences* between the Huesman reference and the present application with regard to the term "prospective gating," but requested that Appellants provide further clarification with regard to the distinctions between the Huesman reference and the pending claims by amending the claims to more clearly emphasize these distinctions. *See* Interview Summary mailed November 23, 2007, page 2. In particular, the Examiner suggested that the Appellants amend the recitation "acquiring" to specify that the acquisition of image data is "initiated and terminated" based on the above-discussed prospective gating points.

Thereafter, Appellants amended independent claims 5-12 and 17-20 in the previously filed Response to the Office Action mailed August 22, 2007. For instance, turning now to the claims, Appellants note that each of the presently pending independent claims 5-12 and 17-20 generally recites initiating and terminating the acquisition of image data based upon two or more prospective gating points. Indeed, these claims reflect the language suggested by the Examiner for distinguishing between a non-continuous acquisition of image data based upon the recited prospective gating points, and the binning or classification of a continuous data stream, as disclosed by the Huesman reference. Thus, it is believed that Appellants have made an earnest and good faith attempt to place the present application in condition for allowance in view of the Examiner's suggested amendments.

Nevertheless, in the Final Office Action mailed on February 5, 2008, the Examiner maintained the Section 102 rejection of independent claims 5-12 and 17-20 in view of the Huesman reference, alleging now that the Huesman reference *does* disclose initiating and terminating image acquisition based on prospective gating points. *See* Final Office Action,

page 4. As the Board will appreciate, these statements appear to contradict the Examiner's earlier acknowledgement during the telephone interview that the image acquisition performed by the Huesman reference is *continuous* (*e.g.*, not acquired in an interrupted manner). Indeed, in the Interview Summary mailed November 23, 2007, it is *clearly* stated that the Examiner "appreciates the differences between the instantly disclosed and reference prospective gating points," pointed out by Appellants. Interview Summary mailed November 23, 2007, page 2. (Emphasis added). Further, as will be discussed below, the Examiner's reasons for rejecting independent claims 5-12 and 17-20 in the Final Office Action do not appear to be based on any evidence which refutes the conclusions reached in the previous telephone discussion regarding the teachings of the Huesman reference. As such, Appellants are unable to ascertain as to what grounds the Examiner has presently rejected independent claims 5-12 and 17-20 despite previously acknowledging the distinctions between the claimed subject matter and the Huesman reference.

With the foregoing in mind, Appellants note that in rejecting independent claims 5-12 and 17-20 in the Final Office Action, the Examiner alleged the following:

> Regarding claims 5-12 and 17-20, Huesman (2002) additionally discloses *initiating* the image data based on a *first prospective gating points* ("peak inspiration" or "near maximum expiration" p. 4) and also *terminates* image data
>
> acquisition based on *a prospective gating point* ("7 cardiac gates" p. 4).
>
> Final Office Action, page 4. (Emphasis added).

In other words, it appears that the Examiner, in formulating this rejection, cited the two respiratory states, "peak inspiration" and "near maximum expiration," as being analogous to "prospective gating points" for initiating the acquisition of image data, and further cited each of the seven "cardiac gates" as analogous to "prospective gating points" for terminating the acquisition of image data. *See* Final Office Action, page 4. However, after

carefully reviewing the teachings set forth in the Huesman reference once again, Appellants are unable to locate any teaching or suggestion with regard to the initiation and termination of image data acquisition based on prospective gating points, as recited by independent claims 5-12 and 17-20. Further, even if the organ states cited by the Examiner could be reasonably considered as being analogous to a "gating point," Appellants note that the Examiner does not appear to have provided any reasoning as to why it is believed that the peak inspiration, near maximum expiration, and cardiac gates are necessarily *prospective* gating points (as opposed to retrospective or other types of gating), nor are Appellants able to identify any teachings in the Huesman reference that would appear to support the Examiner's position.

To the contrary, Appellants submit that pages 3-5 of the Huesman reference, which seems to be the focus of the Examiner's analysis, appears to merely describe a method of image registration. For instance, a cardiac organ, such as the heart, may undergo several stages of motion during each cardiac cycle as it pumps blood through the human body. Unfortunately, the cardiac motion is further subject to additional motion imparted by neighboring organs, such as the respiratory organs (*e.g.*, lungs, diaphragm). Due to this unwanted motion, it may be difficult to compare several cardiac images at various points in time, even if each of the cardiac images corresponds to the same stage of the cardiac cycle. Accordingly, the techniques described on pages 3-5 of the Huesman reference appear to address the foregoing problem by providing a solution in which the respiratory motion is removed <u>retrospectively</u>, thus obviating the need for data loss during active gating. *See* Huesman, page 3.

Specifically, the passages cited by the Examiner generally relate to the use of <u>image registration</u> techniques for removing unwanted respiratory motion from a set of previously acquired cardiac image data. *See id.* at pages 4-5. For example, according to the cited passages, image data representative of respiratory and cardiac organs is obtained over two respiratory states: peak inspiration and near maximum expiration, wherein each state may

further include seven cardiac gates or states. *See id.* at page 4. As illustrated in Figs. 4A and 4B of the Huesman reference, without taking respiratory motion into account, the cardiac images, despite being illustrative of the same "gating state," may exhibit considerable offsets with respect to one another when summed directly. *See id.* at page 5; Figs. 4A-4B. As such, an image registration technique may be applied <u>*subsequent*</u> (*e.g.*, retrospectively) to the acquisition of the image data in order to spatially align the images to compensate for the unwanted respiratory motion that occurred during data acquisition. *See id.* Appellants respectfully assert that this method of operation disclosed by the Huesman reference is *clearly and fundamentally* in contrast with the techniques set forth in the present application, which aim to reduce unwanted motion by <u>*only* acquiring data during intervals in which such unwanted motion is *not present*</u>.

Moreover, Appellants submit that <u>nothing</u> in the Huesman reference appears to teach or even suggest that that the peak inspiration and near maximum expiration respiratory states are used as "prospective gating points" for *initiating* the acquisition of image data, or that the seven cardiac gating states discussed in the Huesman reference are used as "prospective gating points" for *terminating* the acquisition of image data. Further, Appellants submit that such an interpretation appears to be wholly inconsistent with the teachings of Huesman, when applied to the presently pending claims. For example, as discussed above, the Huesman reference states that each interval of peak inspiration includes seven cardiac gates, and that each interval of near maximum expiration also includes seven cardiac gates. *See* Huesman, pages 3-4. For instance, Figs. 3A and 3B illustrate images corresponding to the first cardiac gate during peak inspiration and the first cardiac gate during near maximum expiration. *See id.* (noting that Fig. 3B is described as a "corresponding view" of Fig. 3A during expiration).

Under the Examiner's interpretation of the Huesman reference, as discussed above, image acquisition would be initiated once the peak inspiration state occurs, and terminated once a cardiac gating state (*e.g.*, first cardiac gate) occurs. However, as clearly set forth in the Huesman reference *six more* cardiac gates will occur during the peak inspiration interval. Thus, even assuming these additional six cardiac gates are "prospective gating points" for *terminating* image acquisition, the Examiner has *failed* to show corresponding "prospective gating points" that would *initiate* the image acquisition that would be terminated by the additional six cardiac gates. That is, the Examiner appears to be suggesting that an initiating gating state (*e.g.*, peak inspiration state) occurs and initiates image acquisition, and that the image acquisition terminates once a terminating gating state occurs (*e.g.*, first cardiac gate). However, under this interpretation, *six more* cardiac gates, which the Examiner has cited as being terminating gating states, would occur before image acquisition is ever initiated again (*e.g.*, upon the occurrence of the near maximum expiration state). The same line of reasoning is equally applicable with regard to the additional six cardiac gates associated with the near maximum expiration state. Appellants respectfully assert that this interpretation does not appear to be reasonable in view of the plain teachings of the Huesman reference.

As the Board will appreciate, the Examiner, in interpreting claims in view of alleged prior art, must interpret the claims in a manner that is consistent with the interpretation that those skilled in the art would reach. *See In re Cortright*, 49 U.S.P.Q.2d 1464, 1468 (Fed. Cir. 1999); *see also* M.P.E.P. §2111. With the foregoing in mind, Appellants respectfully disagree with the Examiner's interpretation of the Huesman reference. In particular, although it is unclear as to how the Examiner has chosen to interpret the "initiating and terminating" of image data acquisition "based upon two or more prospective gating points," Appellants respectfully submit that one skilled in the art would *not* read the Huesman reference as teaching that image data is simply *ignored* after the first cardiac gate, and for the duration of the six additional cardiac gates associated with each of the respiratory states, particularly when data associated with the six additional cardiac gates are

explicitly stated as being part of the image dataset. *See* Huesman, page 3 (stating that *each* dataset consists of 26 5-mm short axis slices and *7 cardiac gates*). Further, Appellants can find no language in the Huesman reference that appears to even remotely support the Examiner's position, nor has the Examiner provided any citations that would indicate otherwise.

Instead, based on the above-referenced interview as well as Appellants' review of the Huesman reference, it is strongly believed that the Huesman reference essentially teaches the continuous acquisition of data for some duration of time (*e.g.*, eight second time period, *See* Huesman, page 3), and that the use of "gates" or "gating states" is merely a term used to described some type of marker used to bin or classify the acquired image data in order to provide information corresponding to the state of cyclical motion in which a target organ was undergoing at the time the image data was acquired. To provide additional support for this position, Appellants note that the Huesman reference explicitly mentions that "[u]ngated datasets could be synthesized by *summing* the gated data." Huesman, page 2, paragraph 6. (Emphasis added). In other words, by summing the various groups of binned data, the ungated, or entire original *continuous* set of data may be reconstructed. This is in stark contrast to the recited subject matter, which requires starting and stopping image acquisition based on the prospective gating points, and thus *only* acquires selective *portions* of the image data based on intervals defined by prospective gating points, while ignoring the image data outside of the gating intervals. Thus, assuming hypothetically that the Examiner's interpretation is correct and that the Huesman reference really does disclose an *interrupted* mode of image data acquisition (*e.g.*, initiating and terminating) based on gating states, the "ungated" datasets *could* never be fully synthesized because the data outside the defined gating intervals would *have never been acquired*. In other words, the Examiner's interpretation appears to be contradicted by the plain teachings of the reference itself. As such, Appellants are unable to ascertain as to how the current claim language could be possibly construed as being anticipated by the Huesman reference.

Appellants emphasize again that these positions were *previously* discussed with the Examiner, and further acknowledged *by* the Examiner as being a fair interpretation in distinguishing the Huesman reference from the presently pending claims. *See generally*, Interview Summary mailed November 23, 2007, page 2. Appellants would also like to point out to the Board that the Examiner's comments in the Advisory Action mailed April 30, 2008 appear to simply restate the Examiner's positions with regard to the those set forth in the Final Office Action mailed February 5, 2008, but generally fail to provide any other insightful comments that would further clarify or explain the Examiner's reasoning for maintaining the present rejections.

Therefore, Appellants respectfully submit to the Board that the Huesman reference appears to disclose, at best, that "gating states" may be used to classify or label acquired data based on a particular state that the organ being imaged was undergoing at the time the image was acquired. These teachings are in contrast to the subject matter set forth in independent claims 5-12 and 17-20, which are directed to acquisition of image data that is <u>initiated *and* terminated *based on* two or more prospective gating points</u>. As discussed above, <u>nothing</u> in the Huesman reference appears to teach or suggest that the *acquisition* of the image data is initiated by the peak inspiration or near maximum expiration states or terminated by the cardiac states, both of which were alleged by the Examiner to constitute the "prospective gating points" recited by independent claims 5-12 and 17-20. In view of the foregoing deficiencies, Appellants respectfully submit that the Examiner has failed to establish a *prima facie* case of anticipation under the Huesman reference against independent claims 5-12 and 17-20. For at least the reasons discussed herein, Appellants respectfully request the Board to overturn the Examiner's rejections of independent claims 5-12 and 17-20 under 35 U.S.C. §102(b).

3. **<u>Independent Claims 1-4, 13-16, 21-40</u>: The Examiner's use of the Huesman reference to establish a *prima facie* case of anticipation against independent claims 1-4, 13-16, and 21-40 is improper because the Huesman reference fails to teach or suggest extracting "two or more prospective gating points" and "acquiring a set of motion data using the two or more prospective gating points," as recited by independent claims 1-4, 13-16, and 21-40.**

With regard to independent claims 1-4, 13-16, and 21-40, Appellants submit that these claims recite various systems, methods, and computer programs utilizing a variety of combinations of one or more types of electrical and/or non-electrical sensors for acquiring motion data for one or more organs for purposes of imaging an organ/region of interest. However, Appellants respectfully note that *each* claims 1-4, 13-16, and 21-40 generally requires <u>determining (*e.g.*, extracting) two or more prospective gating points</u> *and* <u>acquiring a set of image data representative of an organ of interest (*e.g.*, a human heart) using the two or more prospective gating points</u>. Appellants do not believe these features are disclosed anywhere in the Huesman reference.

Referring to the above discussion once again, "prospective gating," in accordance with the present application, generally utilizes one or more prospective gating points extracted from a set of motion data for one or more organs in order to time the acquisition of data. *See* Application, page 1, lines 22-27. For example, the extracted prospective gating points may be determined based on a set of motion data and may correspond to one or more intervals of minimal absolute motion for the organ of interest. *See id.* at page 2, line 30 to page 3, line 5. As discussed above, the present application and the claims are directed to the acquisition of image data in an <u>*interrupted* and *non-continuous* manner</u>, such that image data is acquired *only* during the time intervals defined by the extracted prospective gating points, and otherwise ignored for those intervals that fall outside of the prospective gating intervals. *See id.* at page 19, line 29 to page 20, line 9; Fig. 3. By

timing the acquisition of image data based upon the prospective gating points, image data that is generally unaffected by motion artifacts may be acquired during the intervals defined by the prospective gating points and ignored otherwise. *See id.* Accordingly, by acquiring image data *only* during these intervals, the presence of motion artifacts in a resulting image set may be significantly avoided. *See id.* at page 2, line 30 to page 3, line 5.

To the contrary, Appellants reiterate that the Huesman reference does not appear to disclose acquiring a set of image data using prospective gating points in a manner that is consistent with the present application. With the above discussion in mind, Appellants submit to the Board that the Huesman reference, rather than relying on extracted prospective gating points to time the acquisition of image data in order to reduce motion artifacts, acquires *all* the image data continuously up front, classifies or groups the collected data based on known gating states (*e.g.*, cardiac or respiratory gates), and then *subsequently* compensates for motion artifacts present in the image data by applying one or more image registration techniques to the acquired image data. *See* Huesman, pages 4-5.

For example, referring now to Figure 5 of the Huesman reference, an imaging system is illustrated for acquiring a continuous stream of data. *See* Huesman, page 6, Fig. 5. As best understood by Appellants, the illustrated imaging system is configured (*e.g.*, Macintosh® computer running LabVIEW® software) for continuously acquiring data in real time, as illustrated by the cardiac state graph and the respiratory state graph. *See id.* The motions of the cardiac and respiratory organs are further partitioned into various states, each state corresponding to a particular interval in a cycle of motion. *See id.* For instance, the Huesman reference describes partitioning the cardiac motion of a heart into state A, denoted as the "end diastole" stage, state B as the "mid diastole/systole" stage, and state C as the "end systole stage." *See id.* Similarly, respiratory motion is categorized into states I, II, III, IV, and V, depending on various stages of inspiration and

expiration being undergone by the respiratory organ. *See id.* The continuous acquisition of image data by the illustrated ECAT HR Scanner is then grouped according to a "gating state" determined by the combination of the current states of the respiratory and cardiac organs, and stored into an image volume corresponding to the determined gating state. *See id.*

Indeed, it appears that the term "prospective gating," as used in the Huesman reference, merely describes classifying different segments of the image data that is acquired *continuously* without any underlying trigger or conditions. As such, Appellants do not believe that the Huesman reference teaches or even suggests that the image data is acquired *based on* or *using* previously extracted gating points (*e.g.*, prospective gating points), as required by independent claims 1-4, 13-16, and 21-40. Further, as discussed above, even assuming that the "gating states" of the Huesman reference could somehow be considered as being equivalent to the recited "prospective gating points," the Huesman reference only appears to disclose, at best, that image data may be grouped or classified based on the "gating states." It certainly does not appear to teach or suggest, nor has the Examiner shown otherwise, that the image data is *acquired* based on or using the gating states.

In maintaining the rejection of independent claims 1-4, 13-16, and 21-20 in both the Final Office Action mailed February 5, 2008, and the Advisory Action mailed May 5, 2008, the Examiner merely restated the grounds of rejection with regard to independent claims 1-4, 13-16, and 21-40 that were set forth in Office Action mailed on August 22, 2007, but provided no additional clarification in view of the arguments set forth in Appellant's Response to Office Action filed on November 20, 2007. *See* Final Office Action mailed February 5, 2008, page 3; Advisory Action mailed May 5, 2008, page 2. Therefore, because the Examiner has failed to provide *any* reasoning or clear response that would refute Appellants' current position, it is respectfully submitted that the Examiner has failed to establish a *prima facie* case of anticipation under the Huesman

reference against independent claims 1-4, 13-16, and 21-40 for at least the reasons discussed herein. Accordingly, Appellants respectfully request the Board to overturn the Examiner's rejection of independent claims 1-4, 13-16, and 21-40 under 35 U.S.C. §102(b).

4. **Independent Claims 1-40: The Examiner's use of the Huesman reference to establish a *prima facie* case of anticipation against independent claims 1-40 is improper because the Huesman reference fails to teach or suggest the use of "two or more *prospective* gating points" and "two or more *retrospective* gating points," as clearly recited by independent claims 1-40.**

Appellants further note that each of the pending claims, 1-40, recites the use of *both* two or more prospective gating points *and* two or more retrospective gating points. As pointed out in Appellants' previously submitted arguments, this subject matter appears to be entirely absent from the Huesman reference. *See e.g.,* Response to Final Office Action mailed February 5, 2008, pages 34-36. In rejecting claims 1-40, the Examiner alleged that the Huesman reference discloses the above subject matter. In particular, the Examiner correlated the recited "two or more prospective gating points" to two gating states associated with a respiratory organ (*e.g.*, end inspiration and end expiration) and further correlated the recited "two or more retrospective gating points" to two gating states associated with a cardiac organ, such as a heart (*e.g.*, end-diastole and end-systole). *See* Office Action mailed August 22, 2007, page 3. Appellants respectfully submit to the Board that the basis of the Examiner's rejection with regard to these claim features is improper for the reasons set forth below.

First, Appellants note that, the Examiner has *already* asserted that the various cardiac gates (*e.g.*, states of heart motion) equate to *prospective gating points* in the rejection of independent claims 5-12 and 17-20, as discussed above. Further, Appellants reiterate that the present application is *clear* that *prospective gating points* are those used

to selectively time the *real-time* acquisition of image data. *Retrospective gating points*, in contrast, are used to select particular data points that may be of interest from a set of *previously* acquired image data (as opposed to acquiring image data in real-time). *See* Application, page 3, lines 24-28; page 8, lines 4-10. In other words, as *clearly* supported by the present application, prospective and retrospective gating points are distinct elements. As the Board can appreciate, the Examiner, in order to establish a *prima facie* case of anticipation, must demonstrate that the cited reference discloses not only all of the recited features but must also disclose the *part-to-part relationships* between these features. *See Lindermann Maschinenfabrik GMBH v. American Hoist & Derrick*, 221 U.S.P.Q. 481, 486 (Fed. Cir.1984). Thus, Appellants assert that the Examiner's assertion that the end-diastole and end-systole cardiac gating states constitute *retrospective* gating points in rejecting claims 1-40 appears to be *wholly* inconsistent with the Examiner's assertion that the cardiac gating states disclosed by the Huesman reference constitute *prospective* gating states in concurrently rejecting claims 5-12 and 17-20 . As such, Appellants respectfully submit to the Board that the Huesman reference fails to disclose the use of *both* prospective *and* retrospective gating points, as required by *each* of the presently pending claims.

Further, even assuming for the sake of argument that the Examiner's correlation of the "end-diastole" and "end-systole" cardiac states to "retrospective gating points" could somehow be supported in view of the above case law, Appellants are unable to locate any explicit teaching (nor has the Examiner identified any such teachings) in the Huesman reference that would explain or support the Examiner's interpretation. In particular, Appellants submit that there does not appear to be *any* teaching in the Huesman reference which suggests that the respiratory states "end inspiration" and "end expiration" correspond to *prospective*, (i.e., during image acquisition) gating points or that the cardiac states "end-diastole" and "end-systole" correspond to *retrospective* , (i.e., after image acquisition) gating points. Instead, Appellants direct the Board's attention to page 6 of the Huesman reference, which merely states that "[t]he cardiac and respiratory

states are used to elect an output gating state from a 2D lookup table." Huesman, page 6, paragraph 1. Thus, based on Appellants' understanding of the teachings set forth in Huesman, the reference appears to merely disclose that the binning or classification of the incoming image data is based on *both* the current cardiac and respiratory state.

Further, as noted above, prospective and retrospective gating points are *distinct* elements which are used to process and acquire specific data in different ways. In particular, prospective gating points are used to time the acquisition of image data, whereas retrospective gating points are used to select particular data from previously acquired image data. With this distinction in mind, Appellants further submit that nothing in the Huesman reference appears to suggest that the acquisition of image data using the cardiac and the respiratory states are in any way distinct from one another. That is, even assuming hypothetically that the "gating states" mentioned in the Huesman reference could be properly correlated with either the recited "prospective" or "retrospective" gating points," there does not appear to be any difference in the way cardiac and respiratory gating states are used to classify the incoming image data. As such, even *if* the gating states disclosed by the Huesman reference could hypothetically be correlated with <u>either</u> prospective or retrospective gating points, it certainly does not appear that the Huesman reference discloses <u>*both*</u> prospective and retrospective gating, as required by each of claims 1-40.

Moreover, it should be noted that the Examiner has failed to provide *any* reasoning whatsoever as to how it is believed that the respiratory states and cardiac states correspond to prospective and retrospective gating points, respectively, in either the Final Office Action mailed February 5, 2008, or the Advisory Action mailed May 5, 2008. Thus, in view of <u>the Examiner's repeating pattern of failing to explain</u> the basis for the present rejections, Appellants respectfully submit to the Board that the Examiner has failed to establish a *prima facie* case of anticipation under the Huesman reference against

independent claims 1-40. As such, Appellants respectfully request the Board to overturn the Examiner's erroneous rejections of independent claims 1-40 under 35 U.S.C. §102(b).

5. **<u>Independent Claims 4, 8, 12, 16, 20, 24, 28, 32, 36, and 40</u>: The Examiner has failed to provide the minimum level of analysis necessary to support a *prima facie* case of unpatentability of the independent claims 4, 8, 12, 16, 20, 24, 28, 32, 36, and 40, which recited elements using means-plus-function language as permitted by 35 U.S.C. § 112, sixth paragraph.**

In the Final Office Action, the Examiner rejected independent claims 4, 8, 12, 16, 20, 28, 36, and 40, which recite elements using means-plus-function language in accordance with 35 U.S.C. §112, paragraph 6. Specifically, the Examiner alleged that "all means and steps recited in these claims are anticipated by the Huesman (2001) reference as discussed above." *See* Final Office Action, page 4. As an initial matter, Appellants note that the Examiner appears to have omitted independent claims 24 and 32, which also recite elements using means-plus-function language, from the present rejection. Thus, Appellants assume this to be a typographical error on the Examiner's part, and further assume that the Examiner intended for the present rejection to be equally applicable to independent claims 24 and 32. Nevertheless, Appellants submit that the Examiner's rejection of independent claims 4, 8, 12, 16, 20, 24, 28, 32, 36, and 40 is improper for at least the reasons set forth below.

First, for at least the reasons as discussed above, Appellants do not believe the Huesman reference discloses *each* of the elements recited by these claims. Moreover, Appellants note that the Examiner's statements in the Final Office Action fail to include the minimum level of analysis necessary to support a *prima facie* case of unpatentability with respect to claims 4, 8, 12, 16, 20, 24, 28, 32, 36, and 40. As the Board will appreciate, each of these claims recites elements described in means-plus-function language as permitted by 35 U.S.C. §112, sixth paragraph and, therefore, *each of the recited elements should be interpreted in accordance with this body of law*. With respect

to 35 U.S.C. §112, paragraph 6, it is well established that an Examiner "may not disregard the structure disclosed in the specification corresponding to such language when rendering a patentability determination." *In re Donaldson Co.*, 29 U.S.P.Q.2d 1845 (Fed. Cir. 1994); *see also* M.P.E.P. §2181. In other words, proper construction of these claims, of course, requires an analysis of the *structure*, such as the circuit components and their respective arrangements, disclosed by Appellants in the specification for performing the various recited functions.

Directing the Board's attention now to the Examiner's statements in the Final Office Action, it is respectfully noted that the Examiner does not appear to have provided the requisite analysis mentioned above. In particular, Appellants note that the *only* structures in the Huesman reference explicitly identified by the Examiner are an EKG and a pneumatic bellows apparatus, which the Examiner presumably intended to correlated to electrical and non-electrical sensing means. However, throughout the remainder of the rejection, the Examiner appears to have merely asserted that the Huesman reference discloses "means and steps" for acquiring, reconstructing, and "double-gating" image data, without any analysis with regard to what structures correspond to the recited means-plus-function elements of claims 4, 8, 12, 16, 20, 24, 28, 32, 36 and 40. *See* Final Office Action mailed August 22, 2007, pages 3-4 (noting in particular the last paragraph on page 3, and the line 1 on page 4). Therefore, because the Examiner's rejection of claims 4, 8, 12, 16, 20, 24, 28, 32, 36 and 40 fails to conform to the level of analysis required by the above mentioned precedent, Appellants submit that no *prima facie* case of anticipation has been established with regard to these claims.

6. **Request Withdrawal of the Rejection**

For at least the reasons discussed above, Appellants respectfully submit that the Examiner has failed to establish a *prima facie* case of anticipation with regard to independent claims 1-40 in view of the Huesman reference. Accordingly, Appellants respectfully request that the Board direct the Examiner to withdraw the rejection of independent claims 1-40 under 35 U.S.C. §102(b) and to allow these claims.

Conclusion

Appellants respectfully submit that all pending claims are in condition for allowance. However, if the Examiner or the Board wishes to resolve any other issues by way of a telephone conference, the Examiner or Board is kindly invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,

Date: July 3, 2008

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8. APPENDIX OF CLAIMS ON APPEAL

1. A method for imaging an organ, comprising the steps of:

acquiring a set of motion data for two or more organs from at least one of one or more types of electrical sensors and one or more types of non-electrical sensors;

processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for an organ of interest;

acquiring a set of image data representative of the organ of interest using the two or more prospective gating points;

processing a portion of the set of image data based upon the two or more retrospective gating points; and

displaying or storing an image generated from the portion of the set of image data.

2. A computer program, provided on one or more computer readable media, for imaging an organ, comprising:

a routine for acquiring a set of motion data for two or more organs from at least one of one or more types of electrical sensors and one or more types of non-electrical sensors;

a routine for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for an organ of interest;

a routine for acquiring a set of image data representative of the organ of interest using the two or more prospective gating points; and

a routine for processing a portion of the set of image data based upon the two or more retrospective gating points.

3. An imaging system, comprising:

an imager configured to generate a plurality of signals representative of a region of interest;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to receive the plurality of signals, to process a set of motion data describing the motion of two or more organs to derive two or more retrospective gating points for at least one of the organs, and to process a portion of the plurality of signals based upon the two or more retrospective gating signals;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry based upon two or more prospective gating points derived from the set of motion data;

an operator workstation configured to communicate with the system control circuitry and to receive at least the processed portion of the plurality of signals from the data processing circuitry; and

a sensor-based motion measurement system configured to measure electrical or non-electrical activity indicative of the motion of at least one of the two or more organs within the region of interest to contribute to the set of motion data.

4. An imaging system, comprising:

means for acquiring a set of motion data for two or more organs from at least one of one or more types of electrical sensors and one or more types of non-electrical sensors;

means for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for an organ of interest;

means for acquiring a set of image data representative of the organ of interest using the two or more prospective gating points; and

means for processing a portion of the set of image data based upon the two or more retrospective gating points.

5. A method for imaging an organ, comprising the steps of:

acquiring a set of motion data for two or more organs from at least one of one or more types of electrical sensors and one or more types of non-electrical sensors;

processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for an organ of interest;

initiating and terminating the acquisition of a set of image data representative of the organ of interest based on the two or more prospective gating points;

reconstructing the set of image data to generate a set of reconstructed data;

processing a portion of the set of reconstructed data based upon the two or more retrospective gating points; and

displaying or storing an image generated from the portion of the set of reconstructed data.

6. A computer program, provided on one or more computer readable media, for imaging an organ, comprising:

a routine for acquiring a set of motion data for two or more organs from at least one of one or more types of electrical sensors and one or more types of non-electrical sensors;

a routine for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for an organ of interest;

a routine for initiating and terminating the acquisition of a set of image data representative of the organ of interest based on the two or more prospective gating points;

a routine for reconstructing the set of image data to generate a set of reconstructed data; and

a routine for processing a portion of the set of reconstructed data based upon the two or more retrospective gating points.

7. An imaging system, comprising:

an imager configured to generate a plurality of signals representative of a region of interest;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to receive the plurality of signals, to process a set of motion data describing the motion of two or more organs to derive two or more retrospective gating points for at least one of the organs, to reconstruct the plurality of signals to generate a set of reconstructed data, and to process a portion of the reconstructed data based upon the two or more retrospective gating signals;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry based upon two or more prospective gating points derived from the set of motion data to initiate and terminate the acquisition of a set of image data representative of an organ of interest;

an operator workstation configured to communicate with the system control circuitry and to receive at least the processed portion of the plurality of signals from the data processing circuitry; and

a sensor-based motion measurement system configured to measure electrical or non-electrical activity indicative of the motion of at least one of the two or more organs within the region of interest to contribute to the set of motion data.

8. An imaging system, comprising:

means for acquiring a set of motion data for two or more organs from at least one of one or more types of electrical sensors and one or more types of non-electrical sensors;

means for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for an organ of interest;

means for initiating and terminating the acquisition of a set of image data representative of the organ of interest based on the two or more prospective gating points;

means for reconstructing the set of image data to generate a set of reconstructed data; and

means for processing a portion of the set of reconstructed data based upon the two or more retrospective gating points.

9. A method for imaging an organ, comprising the steps of:

acquiring a set of motion data for an organ of interest from at least one or more non-electrical sensors;

processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for the organ of interest;

initiating and terminating the acquisition of a set of image data representative of the organ of interest based on the two or more prospective gating points;

processing a portion of the set of image data based upon the two or more retrospective gating points; and

displaying or storing an image generated from the portion of the set of image data.

10. A computer program, provided on one or more computer readable media, for imaging an organ, comprising:

a routine for acquiring a set of motion data for an organ of interest from at least one or more non-electrical sensors;

a routine for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for the organ of interest;

a routine for initiating and terminating the acquisition of a set of image data representative of the organ of interest based on the two or more prospective gating points; and

a routine for processing a portion of the set of image data based upon the two or more retrospective gating points.

11. An imaging system, comprising:

an imager configured to generate a plurality of signals representative of a region of interest;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to receive the plurality of signals, to process a set of motion data describing the motion of an organ of interest to derive two or more retrospective gating point for the organ, and to process a portion of the plurality of signals based upon the two or more retrospective gating signals;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry based upon two or more prospective gating points derived from the set of motion data to initiate and terminate the acquisition of a set of image data representative of the organ of interest;

an operator workstation configured to communicate with the system control circuitry and to receive at least the processed portion of the plurality of signals from the data processing circuitry; and

a sensor-based motion measurement system configured to measure non-electrical activity indicative of the motion of the organ of interest to contribute to the set of motion data.

12. An imaging system, comprising:

means for acquiring a set of motion data for an organ from at least one or more non-electrical sensors;

means for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for an organ of interest;

means for initiating and terminating the acquisition of a set of image data representative of the organ of interest based on the two or more prospective gating points; and

means for processing a portion of the set of image data based upon the two or more retrospective gating points.

13. A method for imaging an organ, comprising the steps of:

acquiring a set of motion data for an organ of interest from at least one or more non-electrical sensors;

processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for the organ of interest;

acquiring a set of image data representative of the organ of interest using the two or more prospective gating points;

reconstructing the set of image data to generate a set of reconstructed data;

processing a portion of the set of reconstructed data based upon the two or more retrospective gating points; and

displaying or storing an image generated from the portion of the set of reconstructed data.

14. A computer program, provided on one or more computer readable media, for imaging an organ, comprising:

a routine for acquiring a set of motion data for an organ of interest from at least one or more non-electrical sensors;

a routine for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for the organ of interest;

a routine for acquiring a set of image data representative of the organ of interest using the two or more prospective gating points;

a routine for reconstructing the set of image data to generate a set of reconstructed data; and

a routine for processing a portion of the set of reconstructed data based upon the two or more retrospective gating points.

15. An imaging system, comprising:

an imager configured to generate a plurality of signals representative of a region of interest;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to receive the plurality of signals, to process a set of motion data describing the motion of an organ of interest to derive two or more retrospective gating points, to reconstruct the plurality of signals to generate a set of reconstructed data, and to process a portion of the reconstructed data based upon the two or more retrospective gating signals;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry based upon two or more prospective gating points derived from the set of motion data;

an operator workstation configured to communicate with the system control circuitry and to receive at least the processed portion of the plurality of signals from the data processing circuitry; and

a sensor-based motion measurement system configured to measure non-electrical activity indicative of the motion of the organ of interest to contribute to the set of motion data.

16. An imaging system, comprising:

means for acquiring a set of motion data for an organ of interest from at least one or more non-electrical sensors;

means for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for the organ of interest;

means for acquiring a set of image data representative of the organ of interest using the two or more prospective gating points;

means for reconstructing the set of image data to generate a set of reconstructed data; and

means for processing a portion of the set of reconstructed data based upon the two or more retrospective gating points.

17. A method for imaging an organ, comprising the steps of:

acquiring a set of motion data for a respiratory organ of interest from at least one or more electrical sensors;

processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for the respiratory organ of interest;

initiating and terminating the acquisition of a set of image data representative of the respiratory organ of interest based on the two or more prospective gating points;

processing a portion of the set of image data based upon the two or more retrospective gating points; and

displaying or storing an image generated from the portion of the set of image data.

18. A computer program, provided on one or more computer readable media, for imaging an organ, comprising:

a routine for acquiring a set of motion data for a respiratory organ of interest from at least one or more electrical sensors;

a routine for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for the respiratory organ of interest;

a routine for initiating and terminating the acquisition of a set of image data representative of the respiratory organ of interest based on the two or more prospective gating points; and

a routine for processing a portion of the set of image data based upon the two or more retrospective gating points.

19. An imaging system, comprising:

an imager configured to generate a plurality of signals representative of a region of interest;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to receive the plurality of signals, to process a set of motion data describing the motion of a respiratory organ of interest to derive two or more retrospective gating point for the respiratory organ, and to process a portion of the plurality of signals based upon the two or more retrospective gating signals;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry based upon two or more prospective gating points derived from the set of motion data to initiate and terminate the acquisition of a set of image data representative of the respiratory organ;

an operator workstation configured to communicate with the system control circuitry and to receive at least the processed portion of the plurality of signals from the data processing circuitry; and

a sensor-based motion measurement system configured to measure electrical activity indicative of the motion of the respiratory organ of interest to contribute to the set of motion data.

20. An imaging system, comprising:

means for acquiring a set of motion data for a respiratory organ of interest from at least one or more electrical sensors;

means for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for the respiratory organ of interest;

means for initiating and terminating the acquisition of a set of image data representative of the respiratory organ of interest based on the two or more prospective gating points; and

means for processing a portion of the set of image data based upon the two or more retrospective gating points.

21. A method for imaging an organ, comprising the steps of:

acquiring a set of motion data for a respiratory organ of interest from at least one or more electrical sensors;

processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for the respiratory organ of interest;

acquiring a set of image data representative of the respiratory organ of interest using the two or more prospective gating points;

reconstructing the set of image data to generate a set of reconstructed data;

processing a portion of the set of reconstructed data based upon the two or more retrospective gating points; and

displaying or storing an image generated from the portion of the set of reconstructed data.

22. A computer program, provided on one or more computer readable media, for imaging an organ, comprising:

a routine for acquiring a set of motion data for a respiratory organ of interest from at least one or more electrical sensors;

a routine for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for the respiratory organ of interest;

a routine for acquiring a set of image data representative of the respiratory organ of interest using the two or more prospective gating points;

a routine for reconstructing the set of image data to generate a set of reconstructed data; and

a routine for processing a portion of the set of reconstructed data based upon the two or more retrospective gating points.

23. An imaging system, comprising:

an imager configured to generate a plurality of signals representative of a region of interest;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to receive the plurality of signals, to process a set of motion data describing the motion of a respiratory organ of interest to derive two or more retrospective gating points, to reconstruct the plurality of signals to generate a set of reconstructed data, and to process a portion of the reconstructed data based upon the two or more retrospective gating signals;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry based upon two or more prospective gating points derived from the set of motion data;

an operator workstation configured to communicate with the system control circuitry and to receive at least the processed portion of the plurality of signals from the data processing circuitry; and

a sensor-based motion measurement system configured to measure electrical activity indicative of the motion of the respiratory organ of interest to contribute to the set of motion data.

24. An imaging system, comprising:

means for acquiring a set of motion data for a respiratory organ of interest from at least one or more electrical sensors;

means for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for the respiratory organ of interest;

means for acquiring a set of image data representative of the respiratory organ of interest using the two or more prospective gating points;

means for reconstructing the set of image data to generate a set of reconstructed data; and

means for processing a portion of the set of reconstructed data based upon the two or more retrospective gating points.

25. A method for imaging an organ, comprising the steps of:

acquiring a set of motion data for an organ of interest from one or more non-electrical sensors and one or more electrical sensors;

processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for the organ of interest;

acquiring a set of image data representative of the organ of interest using the two or more prospective gating points;

processing a portion of the set of image data based upon the two or more retrospective gating points; and

displaying or storing an image generated from the portion of the set of image data.

26. A computer program, provided on one or more computer readable media, for imaging an organ, comprising:

a routine for acquiring a set of motion data for an organ of interest from one or more non-electrical sensors and one or more electrical sensors;

a routine for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for the organ of interest;

a routine for acquiring a set of image data representative of the organ of interest using the two or more prospective gating points; and

a routine for processing a portion of the set of image data based upon the two or more retrospective gating points.

27. An imaging system, comprising:

an imager configured to generate a plurality of signals representative of a region of interest;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to receive the plurality of signals, to process a set of motion data describing the motion of an organ of interest to derive two or more retrospective gating point for the organ, and to process a portion of the plurality of signals based upon the two or more retrospective gating signals;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry based upon two or more prospective gating points derived from the set of motion data;

an operator workstation configured to communicate with the system control circuitry and to receive at least the processed portion of the plurality of signals from the data processing circuitry;

a sensor-based motion measurement system configured to measure non-electrical activity indicative of the motion of the organ of interest to contribute to the set of motion data; and

a sensor-based motion measurement system configured to measure electrical activity indicative of the motion of the organ of interest to contribute to the set of motion data.

28. An imaging system, comprising:

means for acquiring a set of motion data for an organ from one or more non-electrical sensors and one or more electrical sensors;

means for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for an organ of interest;

means for acquiring a set of image data representative of the organ of interest using the two or more prospective gating points; and

means for processing a portion of the set of image data based upon the two or more retrospective gating points.

29. A method for imaging an organ, comprising the steps of:

acquiring a set of motion data for an organ of interest from one or more non-electrical sensors and one or more electrical sensors;

processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for the organ of interest;

acquiring a set of image data representative of the organ of interest using the two or more prospective gating points;

reconstructing the set of image data to generate a set of reconstructed data;

processing a portion of the set of reconstructed data based upon the two or more retrospective gating points; and

displaying or storing an image generated from the portion of the set of reconstructed data.

30. A computer program, provided on one or more computer readable media, for imaging an organ, comprising:

a routine for acquiring a set of motion data for an organ of interest from one or more non-electrical sensors and one or more electrical sensors;

a routine for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for the organ of interest;

a routine for acquiring a set of image data representative of the organ of interest using the two or more prospective gating points;

a routine for reconstructing the set of image data to generate a set of reconstructed data; and

a routine for processing a portion of the set of reconstructed data based upon the two or more retrospective gating points.

31. An imaging system, comprising:

an imager configured to generate a plurality of signals representative of a region of interest;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to receive the plurality of signals, to process a set of motion data describing the motion of an organ of interest to derive two or more retrospective gating points, to reconstruct the plurality of signals to generate a set of reconstructed data, and to process a portion of the reconstructed data based upon the two or more retrospective gating signals;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry based upon two or more prospective gating points derived from the set of motion data;

an operator workstation configured to communicate with the system control circuitry and to receive at least the processed portion of the plurality of signals from the data processing circuitry;

a sensor-based motion measurement system configured to measure non-electrical activity indicative of the motion of the organ of interest to contribute to the set of motion data;

a sensor-based motion measurement system configured to measure electrical activity indicative of the motion of the organ of interest to contribute to the set of motion data.

32. An imaging system, comprising:

means for acquiring a set of motion data for an organ of interest from one or more non-electrical sensors one or more electrical sensors;

means for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for the organ of interest;

means for acquiring a set of image data representative of the organ of interest using the two or more prospective gating points;

means for reconstructing the set of image data to generate a set of reconstructed data; and

means for processing a portion of the set of reconstructed data based upon the two or more retrospective gating points.

33. A method for imaging an organ, comprising the steps of:

acquiring a set of motion data for one or more organs from at least one of one or more types of electrical sensors and one or more types of non-electrical sensors;

processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for an organ of interest;

acquiring a set of image data representative of the organ of interest using the two or more prospective gating points;

processing a portion of the set of image data based upon the two or more retrospective gating points;

compensating for motion in the portion of the set of image data based upon a set of motion compensation factors derived from one or more pre-acquisition images; and

displaying or storing an image generated from the portion of the set of image data.

34. A computer program, provided on one or more computer readable media, for imaging an organ, comprising:

a routine for acquiring a set of motion data for one or more organs from at least one of one or more types of electrical sensors and one or more types of non-electrical sensors;

a routine for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for an organ of interest;

a routine for acquiring a set of image data representative of the organ of interest using the two or more prospective gating points;

a routine for processing a portion of the set of image data based upon the two or more retrospective gating points; and

a routine for compensating for motion in the portion of the set of image data based upon a set of motion compensation factors derived from one or more pre-acquisition images.

35. An imaging system, comprising:

an imager configured to generate a plurality of signals representative of a region of interest;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to receive the plurality of signals, to process a set of motion data describing the motion of one or more organs to derive two or more retrospective gating points for at least one of the organs, to process a portion of the plurality of signals based upon the two or more retrospective gating signals, and to compensate for motion in the portion of the set of image data based upon a set of motion compensation factors derived from one or more pre-acquisition images;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry based upon two or more prospective gating points derived from the set of motion data;

an operator workstation configured to communicate with the system control circuitry and to receive at least the processed portion of the plurality of signals from the data processing circuitry; and

a sensor-based motion measurement system configured to measure electrical or non-electrical activity indicative of the motion of the one or more organs within the region of interest to contribute to the set of motion data.

36. An imaging system, comprising:

means for acquiring a set of motion data for one or more organs from at least one of one or more types of electrical sensors and one or more types of non-electrical sensors;

means for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for an organ of interest;

means for acquiring a set of image data representative of the organ of interest using the two or more prospective gating points;

means for processing a portion of the set of image data based upon the two or more retrospective gating points; and

means for compensating for motion in the portion of the set of image data based upon a set of motion compensation factors derived from one or more pre-acquisition images.

37. A method for imaging an organ, comprising the steps of:

acquiring a set of motion data for one or more organs from at least one of one or more types of electrical sensors and one or more types of non-electrical sensors;

processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for an organ of interest;

acquiring a set of image data representative of the organ of interest using the two or more prospective gating points;

reconstructing the set of image data to generate a set of reconstructed data; and

processing a portion of the set of reconstructed data based upon the two or more retrospective gating points;

compensating for motion in the portion of the set of reconstructed data based upon a set of motion compensation factors derived from one or more pre-acquisition images; and

displaying or storing an image generated from the portion of the set of reconstructed data.

38. A computer program, provided on one or more computer readable media, for imaging an organ, comprising:

a routine for acquiring a set of motion data for one or more organs from at least one of one or more types of electrical sensors and one or more types of non-electrical sensors;

a routine for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for an organ of interest;

a routine for acquiring a set of image data representative of the organ of interest using the two or more prospective gating points;

a routine for reconstructing the set of image data to generate a set of reconstructed data;

a routine for processing a portion of the set of reconstructed data based upon the two or more retrospective gating points; and

a routine for compensating for motion in the portion of the set of reconstructed data based upon a set of motion compensation factors derived from one or more pre-acquisition images.

39. An imaging system, comprising:

an imager configured to generate a plurality of signals representative of a region of interest;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to receive the plurality of signals, to process a set of motion data describing the motion of one or more organs to derive two or more retrospective gating points for at least one of the organs, to reconstruct the plurality of signals to generate a set of reconstructed data, to process a portion of the reconstructed data based upon the two or more retrospective gating signals, and to compensate for motion in the portion of the set of reconstructed data based upon a set of motion compensation factors derived from one or more pre-acquisition images;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry based upon two or more prospective gating points derived from the set of motion data;

an operator workstation configured to communicate with the system control circuitry and to receive at least the processed portion of the plurality of signals from the data processing circuitry; and

a sensor-based motion measurement system configured to measure electrical or non-electrical activity indicative of the motion of the one or more organs within the region of interest to contribute to the set of motion data.

40. An imaging system, comprising:

means for acquiring a set of motion data for one or more organs from at least one of one or more types of electrical sensors and one or more types of non-electrical sensors;

means for processing the set of motion data to extract two or more prospective gating points and two or more retrospective gating points for an organ of interest;

means for acquiring a set of image data representative of the organ of interest using the two or more prospective gating points;

means for reconstructing the set of image data to generate a set of reconstructed data;

means for processing a portion of the set of reconstructed data based upon the two or more retrospective gating points; and

means for compensating for motion in the portion of the set of reconstructed data based upon a set of motion compensation factors derived from one or more pre-acquisition images.

9. **APPENDIX OF EVIDENCE**

None.

10. <u>APPENDIX OF RELATED PROCEEDINGS</u>

None.